

Railway Age

Vol. 78, No. 28

June 13, 1925

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The International Railway Congress

THE development of railroad transportation has been the greatest single factor in revolutionizing the industrial civilization of the world within the last century. The International Railway Congress, containing representatives of most of the railways of the world, will meet in London this month. The delegates have been invited to attend, while in England, the 100th anniversary of the opening to operation of the Stockton & Darlington, which marked the beginning of the era of steam railroad transportation.

The construction and development of railways have, broadly speaking, been carried out according to two different methods. One of these is the European method; the other, the American method, and when one speaks of American in connection with railroads, Canadian is generally implied also. When the railroad era began the continent of Europe already was well populated. Railways were built there to handle a large traffic which already was available, and their construction was made comparatively permanent. In America the railroads were built to populate and open up the resources of a new country and to handle a passenger and freight business which had yet to be created. Their initial construction was light and temporary. Most of the lines originally built have since been largely re-located to shorten them, or reduce gradients and thereby reduce expenses of operation.

The characteristics of the two general classes of railways are today almost as different as they were a half or three-quarters of a century ago. The railways of Europe and most of those modeled after them handle a passenger business which is relatively very large as compared with their freight business. Most of them handle passenger traffic, and especially that in suburban areas, very efficiently. Their freight locomotives are of comparatively small tractive power, their freight cars of small capacity and in consequence their freight train loads are not large. On the other hand in America passenger business is small compared with freight business. In this country the most outstanding feature of the operation of the railways is the efficiency and economy with which they handle freight. In no way has the mass production characteristic of American industry been developed more highly or on a grander scale than in the transportation of freight. Consequently, nowhere else is a ton of freight carried one mile so cheaply in proportion to the prices of

Le Congrès International des Chemins de Fer

LE développement des transports par voies ferrées a été le seul facteur le plus important qui ait révolutionné la civilisation industrielle du monde, au cours du siècle dernier. Le Congrès International des Chemins de Fer, auquel participeront les représentants de la plupart des chemins de fer du monde, aura lieu à Londres, ce mois-ci. Au cours de leur séjour en Angleterre les délégués ont été invités d'assister aux cérémonies du centenaire de l'ouverture à l'exploitation de la ligne de Stockton à Darlington, qui marqua le début de l'ère des transports par voies ferrées à vapeur.

La construction et le développement des chemins de fer, à bien dire, ont été poursuivis en suivant deux méthodes différentes. L'une est la méthode européenne; l'autre, la méthode américaine, et quand nous faisons allusion à celle-ci, en général, en matière de chemins de fer, la méthode canadienne est également sous entendue. Au début de l'ère des chemins de fer le continent d'Europe était déjà bien peuplé. Les chemins de fer y furent construits pour transporter un trafic important, qui était déjà disponible, et leur construction fut entreprise d'une manière relativement permanente. Aux Etats-Unis, les voies ferrées furent construites pour peupler et mettre à la portée des habitants les ressources d'un pays nouveau, conduire une entreprise destinée à exploiter le transport des voyageurs et des marchandises, qui devait être créée de toutes pièces. Au début, leur construction fut légère et temporaire. Depuis lors, la majorité des lignes construites dès l'origine ont été largement retracées, pour les raccourcir, ou pour diminuer les rampes, en rendre ainsi l'exploitation plus profitable.

Les caractéristiques des deux classes générales de chemins de fer sont, de nos jours, presque aussi différentes qu'elles l'étaient il y a un demi ou trois quarts de siècle. Les chemins de fer d'Europe, et la plupart de ceux qui ont été modelés sur ceux-ci conduisent un commerce de voyageurs, qui est relativement très important, comparé à celui des marchandises. La plupart des réseaux exploitent le trafic des voyageurs, surtout dans les régions suburbaines, d'une manière très capable. Leurs locomotives à marchandises ont une puissance de traction comparativement faible; leurs wagons à marchandises de capacité minime, il en résulte que les charges de leurs trains à marchandises ne sont pas conséquentes. Le point le plus saillant de l'exploitation des chemins de fer de notre pays est la manière capable, et économique, avec laquelle ils manient le frêt. De nulle manière la production en masse, qui caractérise l'industrie américaine, n'a été plus développée, ou sur une échelle aussi vaste, que dans le transport du frêt. Conséquemment n'importe où ailleurs une tonne de frêt est transportée à un mille de distance, aussi bon marché, comparativement aux prix du matériel, du salaire de la main d'œuvre, et des autres frais d'exploitation.

material, the wages of labor and other railroad costs.

The railroads of different parts of the world have been developed along such different lines, not merely because their conditions are different, but, also, because they have not tried very hard to learn from each other. A good many railway officers come from other countries to study railroading in America. Some American railway officers have gone to study railroading in other countries. Most European railway men have, however, been provincial in their attitude toward American railways and most American railway officers have been provincial in their attitude toward European railways. "Conditions are different," they have usually said, and have dismissed from their minds the thought that they could learn from each other.

But conditions have changed and are still changing. The population has become so dense in some parts of the United States that the problems of designing stations and rendering train service to handle commutation traffic are similar to those presented in many European communities, and our railways could learn a good deal from those of other countries about handling passenger business. The railways of many other countries could learn much from those of the United States regarding the most effective means of controlling and reducing the cost of freight transportation.

The International Railway Congress, which usually is held every five years, affords an excellent opportunity for the railway officers of different countries to profit by the exchange of ideas and experience. To a considerable extent this opportunity is being availed of. Many of the reports and discussions presented at the Congress merit careful study by railway officers throughout the world. Unfortunately, although there has been developed in America a distinctive type of railroad transportation, the railway officers of this continent never have very largely participated in the sessions and discussions of the Congress, and in consequence neither the railways of this nor of other countries have benefitted by them as much as has been possible.

This has been partly due to the fact that, except when meetings of the Congress are held in England or the United States, English is not one of the languages used in its sessions, and relatively very few Americans know any other language. Excellent as are many of the papers and discussions at the sessions of the Congress, we venture, also, to suggest that its proceedings would be more interesting and valuable if those in charge of its programs would provide for more reports and discussions of the reasons why the methods and equipment used in freight and passenger transportation differ so widely in different countries and of what may be called the most up-to-date subjects of importance.

The entire world is slowly recovering from the effects of a terrible war. We believe the railway men of the world would be greatly interested in reports regarding the progress that the railway systems of different countries have made back toward normal with respect to their physical condition, their operating expenses, their rates and their financial returns, and what measures they have

Les chemins de fer des différentes parties du monde ont été développés dans des voies différentes, non seulement parce que leurs conditions d'exploitation diffèrent, mais encore parce qu'ils n'ont pas très sérieusement tenté de s'instruire les uns par les autres. Un bon nombre de fonctionnaires de chemins de fer viennent d'autres pays pour étudier la pratique d'exploitation des chemins de fer aux Etats-Unis. D'autre part, certains fonctionnaires américains sont allés à l'étranger, pour y étudier l'exploitation des chemins de fer. Quoique la majorité des chefs de service européens ait manifesté des idées étroites, dans son attitude vis-à-vis des chemins de fer américains, il en a été de même pour les fonctionnaires américains, dans la leur vis-à-vis des chemins de fer européens. Les "conditions sont différentes," disent-ils d'ordinaire, et puis ils écartent la pensée qu'ils pourraient apprendre quelque chose les uns des autres.

Mais les conditions ont changé, et elles continuent à changer. La population est devenue tellement dense, dans certaines parties des Etats-Unis, que les problèmes qui s'y présentent, tant pour le plan des gares, que le maniement du trafic de trains d'abonnés et de banlieue, sont identiques à ceux de nombre de communautés européennes, et de ce fait nos chemins de fer pourraient apprendre beaucoup de ceux des autres pays, au point de vue de la conduite du transport des voyageurs. Les chemins de fer de maints autres pays pourraient beaucoup apprendre de ceux des Etats-Unis, au point de vue des moyens les plus efficaces de contrôler et de diminuer le coût du transport des marchandises.

Le Congrès International des Chemins des Fer, qui, d'ordinaire, a lieu tous les cinq ans, offre aux fonctionnaires des chemins de fer des pays étrangers une excellente occasion pour échanger des idées et leurs expériences. Ils se saisissent de ce rapprochement pour en tirer profit, d'une manière générale. Nombre des rapports et des discussions, présentés et soumis, aux délibérations du Congrès méritent l'étude approfondie des fonctionnaires des chemins de fer du monde entier. Malheureusement, bien qu'aux Etats-Unis un type distinct de transports ferrés ait été développé, les fonctionnaires des réseaux de notre continent n'ont jamais guère participé aux séances, ni aux discussions du Congrès, et en conséquence ni les chemins de fer de notre pays, ni ceux d'autres, n'en ont profité autant qu'ils l'auraient pu.

Nous devons attribuer ceci en partie au fait que, sauf quand les réunions du Congrès ont lieu en Angleterre ou aux Etats Unis, la langue anglaise n'est pas une de celles employées aux séances, et il y a relativement très peu d'américains qui en connaissent d'autres. Quelle que soit l'excellence de nombre des documents qui sont lus, et des discussions qui ont lieu au cours des réunions du Congrès, nous serions portés à conseiller que ses délibérations seraient plus intéressantes et plus utiles, si ceux qui ont la charge des programmes les alimenteraient d'un nombre de rapports plus grand, de discussions de raisons pour lesquelles les méthodes et le matériel employés pour le transport de frêt et des voyageurs diffèrent tant d'un pays à l'autre, soit en un mot de prendre en considération ce que l'on peut nommer les sujets du jour d'importance primordiale.

Le monde entier est en voie de se remettre lentement des effets d'une guerre terrible. Nous croyons que les fonctionnaires des chemins de fer du monde s'intéresseraient vivement aux rapports traitant des progrès que les réseaux ferrés des différents pays ont accomplis, pour revenir aux conditions normales de leur état physique, de leurs frais d'exploitation, leurs tarifs et leurs rendements financiers, et quelles mesures ont été prises pour activer le retour à leur condition antérieure. Quel est le problème qui se présente

adopted to further their return to their normal. What problem is uppermost in the mind of the managers of most or all of the railways of the world? Are we mistaken in assuming that it is the problem of dealing with labor? Could anything that could be presented to the international congresses be more interesting, significant and valuable than reports showing the legislation and methods of conciliation that have been adopted, and the arbitration or other similar boards that had been established for settling controversies arising with labor, and the results that apparently have been and are being secured?

The *Railway Age* hopes that the approaching Congress of the International Railway Association will be successful and profitable. We wish that more American railway officers would take part in its quinquennial proceedings, because we believe the results would be beneficial to the railways of both this and other countries.

Condition of Western and Northwestern Roads

THE need of the western railroads, and particularly those of the northwestern region, for the higher rates for which they have petitioned the Interstate Commerce Commission, is again strikingly illustrated by the recent report of railway revenues and expenses for April and the first four months of 1925. Although the class I railroads of the United States in the first four months this year earned a net railway operating income which was at the rate of only 4.38 per cent for a year on their property investment, or considerably less than the legal fair return, the roads of the western district earned only at the rate of 3.13 per cent and the roads of the northwestern region earned only at the rate of 1.92 per cent. The rate of return for the eastern roads was 5.10 per cent and that of the southern roads was 5.66 per cent. Only the Pocahontas region, which earned at the rate of 6.45 per cent, showed better than the legal fair return. However, while these figures indicate that the northwestern lines have a far greater need for increased revenues than the western lines as a whole, the report does not indicate that the rate of return for the western district as a whole, which includes the northwestern, central western and southwestern regions, was held down solely by the inclusion in its average of the northwestern figures, because the roads of the central western region earned at the rate of only 3.35 per cent and those of the southwestern region only 4.27 per cent, both percentages being less than those of any region outside of the western district. The condition of the northwestern roads has been steadily growing worse for some time and this group of roads is now taking the place formerly occupied by the New England lines, which the commission assisted by ordering an increase in their divisions. In 1923 only the New England lines, among the regions into which the roads are grouped for statistical purposes, earned a lower percentage of return than the northwestern lines, but in 1924 the New England lines earned 3.74 per cent while the northwestern lines earned only 3.12 per cent, which was somewhat less than they earned in 1923. For the first four months of 1925 the New England lines earned at the rate of 5.35 per cent, as compared with 1.92 per cent for the northwestern lines. The latter have also shown a lower percentage with each

davantage à l'esprit des directeurs de la majorité, ou de tous les chemins de fer du monde? Nous trompons nous en supposant que c'est le problème de discuter de la main d'œuvre? Y-a-t-il un sujet plus intéressant, plus significatif et plus utile qui puisse être soumis aux Congrès internationaux, que les rapports traitant de la législation et des méthodes de conciliation qui ont été adoptés, des conseils d'arbitrage, ou d'autres groupes semblables, qui ont été établis dans le but de régler les différends qui existent avec le personnel, et les résultats qui ont été apparemment obtenus, ou vont être atteints.

Le *Railway Age* espère que le Congrès de l'Association Internationale des Chemins de Fer, qui aura bientôt lieu, aura un succès éclatant et que ses délibérations porteront fruit. Nous souhaiterions qu'un plus grand nombre de fonctionnaires des chemins de fer américains participent à ses délibérations quinquennales, car nous avons la conviction que les résultats qui en découleraient seraient heureux et profitables pour les chemins de fer de notre pays et aussi bien que ceux des autres.

month this year, 2.75 for January, 2.63 for two months, 2.11 for three months and 1.92 for four months. The roads of the western district as a whole have also shown a decrease this year as compared with the year 1924, when they earned a return of 3.87 per cent, and this in turn was lower than the rate earned in 1923, 3.96 per cent. Incidentally these figures show that it is not necessary to go far in search of one of the most important reasons for the receivership of the Chicago, Milwaukee & St. Paul, which not only has the newest transcontinental line, but which was without the support of strong affiliated roads operating in other regions which was enjoyed by some of its competitors that have escaped receivership.

The Mechanical Division Meeting

DIVISION V—Mechanical, American Railway Association, will hold a three-day meeting at the Hotel Drake in Chicago on Tuesday, Wednesday and Thursday of next week. This meeting will consider a number of reports of more than ordinary importance and value. The attendance will probably be more or less limited because no great effort has been made to encourage a large gathering. The program indicates, however, that the attendants will have a busy time. This three-day meeting, with a limited attendance, a small car and locomotive exhibit far removed from the meeting place and no advance papers forms quite a distinct contrast to the great meeting which was held at Atlantic City a year ago. More than this, however, it is in almost as great a contrast to the regular annual meetings of such organizations as the American Railway Engineering Association, the International Railway Fuel Association, Traveling Engineers' Association and a number of others whose annual meetings have been growing steadily in importance from year to year. Does this indicate that the functions of the mechanical department are becoming less and less important and that its opportunities are more limited?

President L. F. Loree of the Delaware & Hudson, a civil engineer by training, has always taken a great interest in mechanical department problems—possibly more so than any other chief executive. He has, for instance, been an enthusiastic advocate of the possibilities of the steam locomotive as compared to the electric locomotive and is deeply interested in those details of locomotive de-

sign which promise to increase the capacity of the steam locomotive or assist it to operate with greater efficiency and economy. It is doubtful whether any man on the D. & H. follows more closely the performance of the "Horatio Allen." Mr. Loree believes in using the most up-to-date and effective equipment and facilities in the shops and enginehouses, as well as in all other departments, as is indicated by the program on the Kansas City Southern which has been in process for some time, and which when completed within a year or so will give that road the most up-to-date equipment and facilities of any railroad of its size.

Mr. Loree, however, does not stop with the effort to give improved service and reduce its cost by using the best facilities and equipment, but he also has a keen appreciation of the importance of the human element in a railroad organization. It is true that he has been misunderstood in some quarters because of his activities in the shop strike a few years ago and has been classed as "hard boiled." Those who have been in intimate touch with Mr. Loree and his work, however, realize that he has a deep feeling of comradeship and sympathy for his fellows. As a student of economics he has also followed closely the history and tendencies in the industrial and transportation world and has made every effort to think through those difficult and troublesome problems which are associated with developing the most satisfactory sort of relations between the workers and the management.

It was for these reasons that we asked Mr. Loree if he would not point out in a brief article some of the opportunities and possibilities which confront mechanical department officers. We wish that some means could be found of supplying the printed word with the inspiration and enthusiasm which is so apparent when one has the opportunity of sitting down and chatting about these things with Mr. Loree. Surely the Mechanical Division with such great possibilities before it cannot help but rise to the occasion and do its full share in developing the transportation machine better to meet the needs of the future.

The Same Standards Should Prevail

WE have referred repeatedly in these columns to the discrepancies which prevail between the specifications put forth by many roads for their cross tie requirements and the ties which they are accepting under these specifications and have pointed out the losses which accrue to the railways and to the producers alike over a period of years from lack of adherence to uniform specifications on the part of all roads and in all seasons. Recent investigations indicate that considerable improvement is taking place and that the railways are supporting the American Railway Engineering Association specifications more generally than ever before.

Of late, however, another phase of this problem has assumed sufficient importance to warrant serious consideration. As the forests have receded one road after another has been forced to go beyond its lines for its ties. This has led to the formation of companies of sufficient size to produce and deliver the large number of ties required by individual roads. Within recent months, however, the production of ties along the right-of-way in all parts of the country has increased greatly with the result that the roads are now supplying their needs locally to a greater extent than for a number of years.

These ties are purchased for the same service as those

produced in more remote areas. The requirements should, therefore, be the same. However, the increase in local production along the right-of-way has been accompanied by a marked decline in quality in most areas. This is due in part to the increased number of producers and to their lack of familiarity with the requirements. It is, however, more largely a reflection of the more tolerant attitude of the railways towards the small producers along their lines.

The question may fairly be raised whether this attitude is sound. In the first place, ties will not be produced to standards higher than required by the roads. If under-size ties are accepted, the timber that will produce those ties will be cut and the remainder saved for other purposes. Likewise, if the farmer finds that the railways will accept unsound timber, he will cut it while there is a market for it.

The railways are not buying cross ties to promote local industry or to aid the farmers along their lines, but to meet their requirements. Their first obligation is to those who use their lines to maintain those lines as economically as possible. If ties which adhere to the specifications as to size and quality of timber are required from the large producers, and few men familiar with the demands which traffic makes on track today deny that they are, the same requirements exist for ties produced along the right-of-way.

With the increasing use of treated ties and the concentration of these ties at the treating plants for seasoning, it is possible to check the quality of the ties now being received readily. Such a check will show a marked deterioration in the kind of ties now coming into many yards for treatment. This condition warrants serious consideration for it will affect maintenance costs seriously in the years to come when these ties are taken out of track prematurely.

Stabilizing Employment

SO much attention has been given to the importance of stabilizing employment on the railroads and in the industries that it is not necessary to comment here upon its manifest advantages. Traffic on the railroads naturally fluctuates with general business and prosperity. A study of railway performance over a long period of years indicates the limits within which the traffic is liable to fluctuate in any one year as compared with the preceding or following year. Such fluctuations, depending upon the total business of the year are, of course, quite distinct from the seasonable fluctuations in business which occur during the year and differ on various railroads according to their geographical location or the peculiar conditions under which they operate.

The problem of maintaining a uniform force in train service throughout the year is one thing; the problem of maintaining a uniform force in the equipment maintenance department, however, is quite another thing. The latter problem would appear to be quite susceptible to solution. True, there are many factors which enter into the problem which are more or less intangible, but fortunately we are coming to recognize more and more generally the economic waste involved in useless turnover of employees, and are learning also that the best men will not remain in a business which is so uncertain for certain months each year that they are never sure of a pay check. It is difficult to translate or interpret the lack of uniform employment in terms of dollars and cents loss to the employer, but there can be no question but that it represents a very large amount for an organization the size of an

average railroad. This loss includes not only the effect of the lowering of the morale, lack of co-operation and an indifferent attitude, but also the fact that equipment which should be repaired and put into good shape when it is not needed, is held out of service for need of repairs when business is at its peak or the work on it is so rushed or incomplete that the expense in the end is multiplied. A vivid imagination is not required to visualize the disastrous effects of cutting a force to the limit and allowing the facilities to lie idle a part of the year when business is normally light, in the full knowledge that within a few months the facilities will be found inadequate and will have to be worked to such a limit that the cost per unit of output will be greatly increased.

What would it not mean if the mechanical department officers of our railroads could conduct a thorough and complete investigation of this entire subject and present to the American Railway Association a clean-cut, definite finding as to the desirability of facing up to this problem in a more businesslike manner. It is true that a committee of the Association of Railway Executives is attempting to find some solution of this problem in conjunction with a committee of the Interstate Commerce Commission. On the other hand, mechanical department officers have an intimate and expert knowledge of the functions and operations of their particular department, and undoubtedly can make many suggestions which will be invaluable. Indeed, not a few of the railway mechanical departments, on the basis of such surveys as they have been able to make, have found it possible to greatly improve the conditions within their departments. Would not great good be accomplished if the Mechanical Division could act as a clearing house for these various developments and help to concentrate attention upon this problem?

A Problem of Alloy Steel Utilization

THE possibilities for reducing the weight of locomotive forgings and castings through the use of alloy steels specially heat treated to develop their superior properties of life and strength attracted wide attention in the railroad field during a period of several years about a decade ago. The use of such alloys in heavy sections, such as are required for locomotive parts, was new at that time and difficulties which were met in the early manufacture and heat treatment of these materials to insure the actual development in service of the properties anticipated led to the gradual loss of interest in them during a period of several years following the initial attempt at their introduction. The gradual perfection of the technique of manufacture and the subsequent treatment in the fabrication of finished parts, however, has since fully insured the complete practicability of a number of alloys requiring a considerable range of heat treatment, and the use of these steels is gradually extending. That the need for their use is recognized by some of the more far-seeing executives, as well as by officers of the mechanical department, will be evident to one who reads the statement of L. F. Loree on mechanical department possibilities on another page in this issue, in which he specifically mentions the use of high tensile alloy steel castings and forgings as one of the needs the fulfillment of which we may look forward to in the mechanical department.

The use of such materials, however, is creating a problem which soon must be given attention by the railroads if the full value is to be obtained from them and, indeed,

if the continued enjoyment of the benefits of these materials is to be insured for the future. This problem is the proper handling of such materials in the railroad shops when the time comes that they must be repaired on an extensive scale or that parts must be removed from service because of the accumulation of wear which requires that the material be reworked into other forms and applied to other purposes.

Some railroads have already recognized the fact that blacksmith shop equipment and methods which have proved entirely adequate in dealing with carbon steels, mostly of comparatively low carbon content, are entirely inadequate to deal with the specially heat treated alloy steels which depend for their physical properties on accurate control both of the heating and cooling operations involved in working them. Enough has been done to indicate that a satisfactory solution of this problem can be worked out. Suitable furnace equipment and apparatus for accurately controlling heating operations is available and the proper technique for the cooling operations is known. There are other factors in the problem, however, which must be determined by each railroad to suit its own conditions. Careful consideration must be given to such questions as where these materials are to be handled—whether at one shop or more than one shop on each system—when heat is required to restore them to further service in their original form, to what uses worn parts which require reworking into other forms are to be put, and what special training is necessary to develop a personnel sufficiently skilled to insure that accurate results may be obtained.

Enough has been said to indicate that the problem is one with sufficient ramifications to demand advance study and preparation in order that satisfactory results may be obtained from special alloy steels beyond the period which may be called the first cycle of their application, that is, when they have become an established part of the construction of all equipment. That they will become so established is at this time almost beyond question.

Section VI and the Mechanical Convention

PURCHASING and stores officers should not overlook the advantages to be gained from attendance at the meeting of the Mechanical Division of the A. R. A. at Chicago on June 16-18, for the mechanical department represents the largest single user of the materials and supplies passing through the hands of purchasing and stores officers. The conditions under which much of this material is bought and stored are controlled largely by the mechanical officers. The liaison between the two sections should therefore be highly developed. A number of subjects will be presented at the meeting of the Mechanical Division which will be of interest to purchasing and stores officers. Further than this, these officers are coming more generally to realize that surplus and waste, slovenly buying and delayed delivery are burdens on transportation which must be removed. Purchasing and stores officers must therefore maintain the closest contact with other branches of railway service. With all departments having the same ultimate objective, each section is of necessity concerned with the problems of the others.

That purchasing and stores officer who can attend all or a portion of the meetings of the Mechanical Division will be better prepared to meet the requirements of the mechanical department on his own road.

Intensive Service Demands Balanced Development

ONE of the problems of prime importance before operating and mechanical officers at the present time is the more effective utilization of the locomotive. To the operating officer this means the securing of more ton-miles per train-mile and more miles per locomotive per day. Better train loading is a matter largely within the control of the operating officer. More locomotive miles per day is not entirely within his control; it involves a consideration of every facility in the mechanical department having to do with locomotives. It is perhaps for this reason that the subject is only touched on by the writers on the future possibilities of the mechanical department elsewhere in this issue; to discuss the utilization of locomotives from the mechanical department standpoint would involve a consideration of engine terminal location, the future policy of the railroad with respect to terminal improvements, the relation between back shop and running repairs, standards of current maintenance and questions of locomotive detail design.

For many years it has been apparent to observers that the development of facilities for the maintenance and reconditioning of locomotives has not been keeping pace with the size and number of locomotives and the added complications in their construction. This condition has had a marked tendency to decrease the effective time during which each unit is available for service and the remedy most often applied—that is, a further increase in the number of locomotives owned—has only complicated the situation by increasing the congestion at shops and terminals. One of the most salutary results likely to come from intensive efforts to increase the amount of service obtained from each locomotive is an appreciation on the part of operating officers and executives of the need for a high standard of maintenance and a complete recasting of shop and terminal facilities.

It has been found where the experiment has been tried that a high standard of maintenance, systematically sustained, is not only an effective means of keeping locomotives in service, but of reducing the maintenance cost per unit of service as well. The demand for more service from the locomotive with its requirement for better maintenance, if carried far enough, will inevitably lead to cheaper maintenance.

Already the extension of locomotive runs as one means of increasing miles per locomotive per day has led to the concentration of running repairs at the better equipped terminals, thereby reducing the amount of work done at many poorly equipped terminals and increasing the possibility for future improvements at the important terminals.

If the demand for increased locomotive utilization is pushed insistently, it will also eventually bring to light the need for greater dispatch in passing locomotives through the back shop. It will disclose the need for better machine tools and for standardization of many detail parts to permit their manufacture for replacement purposes on a centralized production basis. It will hasten the day when back shop work is adequately scheduled.

It is clearly evident without carrying the discussion further that no matter what operating practices may be adopted to bring about a more effective utilization of locomotives, any intensive campaign toward that end will force a balanced development as between the locomotives to be maintained and the shop and terminal facilities with which they must be maintained. This fact alone is sufficient to

justify the whole-hearted support by mechanical department officers of the new movement toward increased locomotive utilization.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

International Trade in Wheat and Wheat Flour, by J. A. LeClerc. A statistical study of production and consumption of wheat, with figures usually from 1910-1923 incl. U. S. Dept. of Commerce. Trade promotion series no. 10. 290 p. Pub. by Govt. Print. Off., Washington. 40 cents.

Science in Modern Industry, edited by Prof. J. H. Willits. Papers on contributions of research to industry, scientific methods in purchasing, management, personnel research, and so on. Annals of the American Academy of Political and Social Science, May, 1925. 162 p. Pub. by the Academy, Philadelphia, Pa. \$2.

Waterways and Inland Seaports, by Brig. Gen. T. Q. Ashburn. History of waterways, waterway-railway relations, and need for co-ordination of transportation. Statistics on waterway operation for 1924. 32 p. Pub. by Govt. Print. Off., Washington. 10 cents.

Periodical Articles

Art in the Railway Poster. Posters issued by foreign railways. Nation's Business, June, 1925, p. 20-21.

A History of the Atchison, Topeka & Santa Fe Railway System, by W. B. Storey. Illustrations and map. Shipper & Carrier, June, 1925, p. 4-11, 53.

The Human Factor in Transportation, by L. A. Downs. Trade and Transportation Bulletin, June, 1925, p. 1-2.

Our Company Pays 23 Kinds of Taxes, by Jacob Pfeiffer. An itemized inquiry into state and federal taxes, and what might be done for tax economy. Nation's Business, June, 1925, p. 15-17.

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Rogers Alone Built Great Road, by R. R. Batson. Brief history of the Virginian Railway. American Industries, June, 1925, p. 20.

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New Books

Port Development. By Roy S. MacElwee. Size, 6 in. by 9 in. 456 pages, including index. Bound in cloth. Illustrated. Published by McGraw-Hill Book Company, Inc., New York.

Probably no one in this country has made a deeper or more thorough study of marine transportation and its relation to the development of seaports than the author of this book. Dr. MacElwee, who has already contributed voluminously to the literature of ports and terminals, in the present work has compressed an enormous amount of interesting and valuable information into a relatively small space. The work will be found of value to everyone wishing to acquire a general knowledge of the building up of ports and the handling of the goods shipped through them.

Railways of the World Compared

Selected statistics show widely varying conditions—The need for better information

FOR purposes of comparison, selected statistics of railways in various parts of the world are shown in tables herewith. Table I gives the mileage, area and population, with ratios, of every country in the world which has over 500 miles of railway line. Table II gives in considerably more detail operating and financial details of the railways in some of the countries which are more important from the railway standpoint. The figures will give to the reader some notion of the wide divergence in railroad development, methods, ownership and condi-

tions between railways in different parts of the world. It is, however, chiefly from a standpoint of their general interest, rather than their strictly scientific value, that they should be looked upon.

This condition exists primarily because there is no uniformity among railway statistics compiled in different countries. Each country has its own standards—or no standards at all—and when figures from different countries are grouped together for comparative purposes it is unsafe to draw anything but the most general inferences

TABLE I

| Country | Route mileage | Area sq. mi. | Route mi. per 100 sq. mi. | Population | Route mi. per 1,000 pop. | Predominant ownership and operation |
|---|---------------|--------------|---------------------------|-------------|--------------------------|-------------------------------------|
| Alaska | 770 | 590,884 | 0.13 | 55,036 | 1.4 | Govt. |
| Algeria and Tunis | 4,220 | 272,180 | 1.55 | 7,907,554 | 0.53 | Govt. |
| Angola | 818 | 484,800 | 0.17 | 4,119,000 | 0.2 | Private |
| Argentina | 23,156 | 1,153,418 | 2.0 | 9,548,092 | 2.4 | Private |
| Asia Minor, Syria, Arabia, Cyprus | 3,829 | 1,263,584 | 0.3 | 20,414,982 | 0.19 | Private |
| Austria | 3,939 | 32,396 | 12.16 | 6,526,661 | 0.6 | Govt. |
| Australia, Tasmania, New Zealand | 29,203 | 3,078,149 | 0.94 | 6,715,707 | 4.35 | Govt. |
| Belgian Congo | 1,263 | 909,654 | 0.14 | 10,000,000 | 0.13 | Private |
| Belgium | 6,893 | 11,752 | 58.66 | 7,465,782 | 0.92 | Govt. |
| Bolivia | 1,502 | 514,595 | 0.29 | 2,820,074 | 0.53 | Govt. |
| Brazil | 18,704 | 3,276,358 | 0.57 | 30,635,605 | 0.61 | Govt.* |
| British East Africa | 851 | 245,060 | 0.35 | 2,500,000 | 0.34 | Govt. |
| Bulgaria | 1,624 | 40,667 | 3.99 | 4,958,400 | 0.33 | Govt. |
| Canada | 40,094 | 3,729,665 | 1.07 | 8,788,483 | 4.56 | Govt.* |
| Ceylon | 732 | 25,481 | 2.87 | 4,497,599 | 0.16 | Govt. |
| Chile | 5,301 | 289,796 | 1.83 | 3,774,485 | 1.4 | Govt. |
| China | 6,838 | 4,277,170 | 0.16 | 400,806,000 | 0.02 | Govt. |
| Colombia | 926 | 476,916 | 0.19 | 6,300,000 | 0.15 | Private |
| Costa Rica | 546 | 23,000 | 2.37 | 485,049 | 1.12 | Private |
| Cuba | 3,005 | 41,634 | 7.22 | 3,123,040 | 0.96 | Private |
| Czechoslovakia | 8,718 | 54,877 | 15.87 | 13,613,172 | 0.64 | Govt. |
| Denmark | 3,086 | 17,144 | 18.0 | 3,352,000 | 0.56 | Govt. |
| Dutch East Indies | 1,882 | 454,153 | 0.41 | 44,616,496 | 0.04 | Govt. |
| Ecuador | 652 | 220,502 | 0.3 | 1,328,821 | 0.49 | Govt. |
| Egypt and Sudan | 4,894 | 1,364,400 | 0.36 | 18,600,918 | 0.26 | Govt. |
| Estonia | 890 | 16,955 | 5.25 | 1,109,479 | 0.8 | Govt. |
| Finland | 2,666 | 132,510 | 2.01 | 3,366,507 | 0.79 | Govt. |
| France | 33,281 | 212,659 | 15.65 | 39,402,739 | 0.84 | Private |
| French Indo-China | 1,490 | 256,878 | 0.58 | 19,747,431 | 0.08 | Govt. |
| French W. Africa | 1,860 | 1,800,566 | 0.1 | 12,283,962 | 0.15 | Govt. |
| Germany | 35,823 | 182,271 | 19.27 | 59,858,284 | 0.60 | Quasi-Private |
| Greece | 1,983 | 41,933 | 4.73 | 2,646,913 | 0.75 | Govt. |
| Guatemala | 613 | 48,290 | 1.27 | 2,119,165 | 0.28 | Private |
| Honduras | 559 | 46,332 | 1.2 | 673,408 | 0.83 | Private |
| Hungary | 5,921 | 35,911 | 16.49 | 7,945,878 | 0.75 | Govt. |
| India | 40,090 | 1,802,629 | 2.22 | 319,075,132 | 0.13 | Govt.† |
| Italy | 12,501 | 117,982 | 10.6 | 38,835,941 | 0.32 | Govt. |
| Japan, (including Chosen and Formosa) | 12,284 | 260,738 | 4.71 | 76,987,469 | 0.16 | Govt. |
| Jugoslavia | 5,699 | 96,134 | 5.93 | 12,017,323 | 0.47 | Govt. |
| Latvia | 1,770 | 25,000 | 7.0 | 1,885,870 | 0.94 | Govt. |
| Lithuania | 1,939 | 59,633 | 3.25 | 2,293,100 | 0.85 | Govt. |
| Malay States, Borneo-Celebes | 1,163 | 366,118 | 0.32 | 6,267,411 | 0.19 | Govt. |
| Mexico | 16,443 | 767,198 | 2.14 | 13,887,080 | 1.18 | Govt. |
| Morocco | 862 | 231,500 | 0.37 | 6,002,000 | 0.14 | Govt. |
| Netherlands | 2,141 | 12,582 | 17.01 | 7,086,913 | 0.3 | Private |
| Newfoundland | 951 | 42,734 | 2.23 | 259,358 | 3.67 | Govt. |
| Nigeria | 1,126 | 332,000 | 0.34 | 16,250,000 | 0.07 | Govt. |
| Norway | 2,141 | 124,964 | 1.71 | 2,649,775 | 0.81 | Govt. |
| Peru | 1,988 | 722,461 | 0.28 | 4,634,601 | 0.43 | Private |
| Philippines | 810 | 115,026 | 0.7 | 10,350,640 | 0.08 | Private |
| Poland | 9,872 | 149,140 | 6.62 | 27,372,447 | 0.36 | Govt. |
| Portugal | 2,129 | 35,490 | 5.99 | 5,628,610 | 0.38 | Private* |
| Rhodesia and Bechuanaland | 2,468 | 715,000 | 0.35 | 1,890,120 | 1.31 | Private |
| Roumania | 7,325 | 122,282 | 5.99 | 17,393,149 | 0.42 | Govt. |
| Russia | 42,084 | 8,166,130 | 0.52 | 131,546,045 | 0.32 | Govt. |
| Siam | 1,423 | 194,568 | 0.7 | 8,266,408 | 0.17 | Govt. |
| Spain | 9,644 | 194,733 | 4.95 | 21,347,335 | 0.45 | Private |
| Sweden | 9,436 | 173,157 | 5.45 | 5,904,489 | 1.6 | Govt. |
| Switzerland | 3,323 | 15,976 | 20.8 | 3,880,320 | 0.86 | Govt. |
| Tanganyika | 892 | 365,000 | 0.24 | 4,107,000 | .. | Govt. |
| Union of South Africa and German S. W. Africa | 11,747 | 795,489 | 1.48 | 7,156,012 | 1.64 | Govt. |
| United Kingdom | 24,396 | 121,633 | 20.06 | 47,307,601 | 0.52 | Private |
| United States of America | 260,544 | 3,026,789 | 8.6 | 105,710,620 | 2.46 | Private |
| Uruguay | 1,653 | 72,153 | 2.29 | 1,603,000 | 1.03 | Private |
| Venezuela | 660 | 393,976 | 0.17 | 3,000,000 | 0.22 | Private |

†A large mileage is owned by government and operated by private companies.
*Important proportion of mileage is also under the opposite form of ownership.

TABLE II

| Country | Year ending | Miles of line | Capital | Capital per mile | Passenger revenue | Freight revenue | Total revenue | Total operating expenses | Net operating revenue | Operating ratio (per cent) | Average receipts per passenger-mile (cents) | Average receipts per ton-mile (cents) | Employees | Aggregate compensation of employees yearly | Average yearly compensation per employee a |
|---|---------------|---------------|-----------------|------------------|-------------------|-----------------|---------------|--------------------------|-----------------------|----------------------------|---|---------------------------------------|-----------|--|--|
| Argentina Republic | Dec. 31, 1918 | 21,449 | \$1,408,803,764 | \$66,615 | 43,047,697 | 128,597,002 | 171,644,699 | \$132,906,359 | \$42,410,108 | 75.81 | 1.057 | 1.488 | 227,775 | 74,850,258 | 329 |
| Austria—State Railways | Dec. 31, 1913 | 11,987 | 1,347,769,192 | 114,791 | 13,732,282 | 33,464,705 | 47,196,987 | 41,663,632 | 42,383,747 | 76.97 | 1.057 | 1.488 | 227,775 | 74,850,258 | 329 |
| Austria—Private Railways | Dec. 31, 1913 | 2,488 | 398,748,655 | 155,250 | 22,446,865 | 4,968,295 | 27,415,160 | 24,446,031 | 17,444,031 | 70.73 | 1.161 | 1.591 | 73,425 | 20,739,509 | 365 |
| Belgium—State Railways | Dec. 31, 1913 | 2,715 | 532,168,550 | 196,027 | 1,670,994 | 4,675,232 | 6,346,226 | 48,032,103 | 17,948,025 | 72.80 | 0.579 | b | 73,425 | 20,739,509 | 365 |
| Belgium—Private Railways | Dec. 31, 1913 | 217 | b | b | 27,640,912 | 84,115,566 | 111,756,478 | 118,904,624 | 4,035,853 | 42.66 | b | b | 66,201 | b | b |
| Brazil | Dec. 31, 1917 | 12,782 | b | b | 4,301,050 | 9,574,073 | 13,875,123 | 13,784,446 | 12,513,545 | 90.48 | 2.908 | 6.131 | 18,521 | 233,294,000 | 1,408 |
| Brazil—State Railways | Dec. 31, 1918 | 1,612 | 71,832,284 | 52,475 | 79,255,655 | 315,577,292 | 400,832,947 | 393,927,406 | 11,065,855 | 92.56 | 2.991 | 3.091 | 18,521 | 233,294,000 | 1,408 |
| Canada | Dec. 31, 1922 | 39,773 | 2,159,277,131 | 54,290 | 14,091,580 | 21,379,919 | 35,471,499 | 22,607,134 | 17,115,801 | 89.40 | 2.820 | 1.039 | 185,635 | b | b |
| China—Government Railways | Dec. 31, 1922 | 3,902 | 227,778,732 | 58,375 | 17,665,091 | 25,631,002 | 43,296,093 | 62,404,820 | 16,733,211 | 56.91 | 0.672 | 0.785 | 91,356 | b | b |
| Denmark—State Railways | Dec. 31, 1922 | 1,490 | 128,023,813 | 85,922 | 17,233,187 | 17,327,028 | 34,560,215 | 26,008,352 | 9,618,511 | 73.00 | 2.717 | 6.456 | 19,533 | b | b |
| Egypt—State Railways | Dec. 31, 1922 | 1,995 | b | b | 50,630,840 | 107,310,600 | 157,941,440 | 230,532,565 | 72,948,134 | 114.66 | 1.640 | 4.839 | 786,466 | 321,639,536 | 409 |
| France—State Railways | Dec. 31, 1921 | 18,905 | 4,458,136,127 | 215,579 | 238,186,722 | 570,975,462 | 809,162,184 | 1,023,876,422 | 243,684,470 | 107.81 | 1.969 | 4.010 | 786,466 | 321,639,536 | 409 |
| France—Private Railways | Dec. 31, 1921 | 38,154 | 4,580,404,042 | 120,049 | 232,242,239 | 526,743,807 | 758,986,046 | 592,716,555 | 166,269,491 | 70.01 | 0.908 | 1.244 | 786,466 | 321,639,536 | 409 |
| Germany | Dec. 31, 1922 | 20,294 | b | b | 437,927,650 | 533,855,450 | 971,783,100 | 808,325,650 | 163,457,450 | 81.00 | 2.66 | b | 786,466 | 321,639,536 | 409 |
| Great Britain | Dec. 31, 1923 | 21,119 | b | b | 121,949,097 | 187,748,122 | 309,697,219 | 236,795,456 | 105,939,308 | 69.09 | 0.644 | 1.032 | 753,472 | b | b |
| Holland—State Railways | Dec. 31, 1923 | 37,618 | 2,171,507,324 | 57,725 | 89,836,335 | 65,817,020 | 155,653,355 | 244,137,280 | 14,867,369 | 94.26 | b | b | 753,472 | b | b |
| India | Dec. 31, 1918 | 9,102 | 768,897,066 | 118,636 | 8,688,231 | 4,438,029 | 13,126,260 | 17,017,280 | 54,106,141 | 69.03 | 0.993 | 1.072 | 152,803 | 51,308,100 | 313 |
| Italy—State Railways | Dec. 31, 1921 | 6,481 | 108,197,533 | 53,937 | 8,688,231 | 4,438,029 | 13,126,260 | 17,017,280 | 54,106,141 | 69.03 | 0.993 | 1.072 | 152,803 | 51,308,100 | 313 |
| Japan—State Railways | Mar. 31, 1920 | 2,006 | 195,999,071 | 81,378 | 28,880,809 | 38,707,703 | 67,588,512 | 54,097,286 | 19,936,673 | 73.07 | 1.688 | 2.498 | 165,822 | 45,439,995 | 278 |
| New South Wales—State Railways | Mar. 31, 1923 | 3,037 | 195,999,071 | 64,535 | 11,779,942 | 19,046,800 | 30,826,742 | 26,777,902 | 5,936,940 | 81.79 | b | b | 15,728 | 16,784,281 | 1,067 |
| Norway | June 30, 1922 | 2,284 | 141,293,175 | 66,689 | 14,932,994 | 17,275,430 | 32,208,424 | 33,682,127 | 1,673,893 | 102.79 | 3.494 | 5.008 | 11,728 | b | b |
| Norway—State Railways | June 30, 1922 | 5,784 | 217,790,090 | 37,555 | 7,532,189 | 15,112,843 | 22,645,032 | 23,499,627 | 8,945,322 | 38.72 | b | b | 15,726 | b | b |
| Queensland—State Railways | June 30, 1922 | 3,636 | 23,426,341 | 36,839 | 1,171,133 | 1,275,604 | 2,446,737 | 12,342,846 | 1,673,893 | 38.72 | b | b | 15,726 | b | b |
| South Australia—State Railways | June 30, 1922 | 2,357 | 57,926,842 | 45,394 | 3,796,862 | 73,208,425 | 77,005,287 | 12,342,846 | 1,673,893 | 38.72 | b | b | 15,726 | b | b |
| Sweden | Dec. 31, 1921 | 9,436 | 470,075,462 | 45,394 | 30,796,862 | 73,208,425 | 104,005,287 | 11,342,846 | 3,090,648 | 76.94 | 1.910 | 3.058 | 55,188 | 73,836,842 | 1,338 |
| Switzerland | Dec. 31, 1921 | 3,358 | 470,075,462 | 45,394 | 30,796,862 | 73,208,425 | 104,005,287 | 11,342,846 | 3,090,648 | 76.94 | 1.910 | 3.058 | 55,188 | 73,836,842 | 1,338 |
| Union of South Africa—State Railways | Dec. 31, 1921 | 3,358 | 470,075,462 | 45,394 | 30,796,862 | 73,208,425 | 104,005,287 | 11,342,846 | 3,090,648 | 76.94 | 1.910 | 3.058 | 55,188 | 73,836,842 | 1,338 |
| United Kingdom | Dec. 31, 1921 | 3,358 | 470,075,462 | 45,394 | 30,796,862 | 73,208,425 | 104,005,287 | 11,342,846 | 3,090,648 | 76.94 | 1.910 | 3.058 | 55,188 | 73,836,842 | 1,338 |
| United States of America—Class I roads | Dec. 31, 1923 | 23,724 | 6,520,217,654 | 274,816 | 432,890,758 | 556,833,831 | 989,724,589 | 55,723,081 | 17,483,794 | 82.73 | 3.358 | 3.358 | 766,381 | 3,004,071,882 | 1,617 |
| United States of America—Class II roads | Dec. 31, 1923 | 23,724 | 6,520,217,654 | 274,816 | 432,890,758 | 556,833,831 | 989,724,589 | 55,723,081 | 17,483,794 | 82.73 | 3.358 | 3.358 | 766,381 | 3,004,071,882 | 1,617 |
| Victoria—State Railways | June 30, 1922 | 4,317 | 306,621,988 | 71,028 | 1,143,098,579 | 4,666,720,422 | 5,809,819,001 | 4,895,166,819 | 1,394,413,208 | 74.38 | 1.116 | 1.116 | 1,857,674 | 32,676,732 | 1,212 |
| Western Australia—State Railways | June 30, 1922 | 3,433 | 362,150,112 | 26,041 | 23,499,650 | 2,446,737 | 25,946,387 | 39,090,735 | 13,463,587 | 74.38 | b | b | 26,961 | 32,676,732 | 1,212 |
| | | | | | 4,679,616 | 8,216,998 | 13,761,761 | 11,333,514 | 2,428,447 | 82.35 | b | b | 7,784 | 9,168,953 | 1,177 |

NOTE: a Information not available. b Passenger train revenue. c Cost of road and equipment. d Includes baggage revenue. e Includes exchange. f American equivalent at the normal rate of exchange. g Statistics for these countries taken from other official sources. SOURCE: Official railway reports of the various countries except for Argentina, Brazil and Bulgaria. Statistics for these countries taken from I. C. C. Reports. Prepared by Bureau of Railway Economics, Washington, D. C., except for U. S. Railways which were taken from I. C. C. Reports.

from them; and even to do this requires some knowledge, beyond the statistics, of the conditions obtaining in the various countries. As for instance, when comparing ratios of mileage to population and area: Are there any other means of transportation besides the railroads? Is any considerable proportion of the country a virtual desert? What is the character of the economic life of the country—what does it produce? Are its people mostly of civilized races or otherwise? Is the line mileage shown of single track and light construction or are there multiple tracks and extensive facilities making for increased utilization of lines? All these questions must be answered before one can say definitely that railroading has gone farther in one country than another, simply because the figures seem to indicate that condition.

Similarly, it is not particularly profitable to try to judge relative efficiency of lines in different countries by comparing capitalization, rates, revenues, and operating ratios. It is necessary also to know something of the physical character of the country, the fuel situation, the wage level, character of labor and the nature of the traffic. The necessity for securing similar additional information in making other statistical comparisons will be apparent to the reader. Moreover, there is still another reason for caution—that is that it is impossible to secure statistics for all the railways of the world for exactly the same period. Official statistics for some countries, moreover, do not include all their railways.

Sources of Information

The main source of the mileage statistics shown in Table 1 is the official German publication, Archiv für Eisenbahnwesen, and the main source of the statistics on population and area, the World Almanac—checked against the Statesman's Yearbook. The Archiv's figures were also checked with other sources of information, but in most instances where a question arose, its authority was relied upon. There are a few important exceptions to this, however. One is with reference to French Equatorial Africa, which was shown with a mileage for which no corroboration elsewhere was obtainable, and another is Southern Rhodesia and Bechuanaland, which the Archiv did not show at all in its compilation of railway mileage of the world.

Table II was prepared almost in its entirety by the Bureau of Railway Economics, and the Railway Age is also indebted to the Bureau for making available its extensive collection of railway statistics of various countries compiled from official sources.

Co-ordination Needed

At best the effort to show some comparisons between railways of the world is but a step on a route which is bestrewn with obstacles, but if such statistics could be secured promptly from the various railway administrations, sufficiently well described so that skilled statisticians could reduce them to common denominations, the resulting comparisons would be valuable indeed. The cooperation of all important railway administrations would be necessary, of course, as well as a central body to perform the work of coordination.

Railway Congresses of Other Days

First in Brussels, 1885—Present is first to be held in an English-speaking country since Washington, 1905

IN 1885 the Belgian railways celebrated at Brussels the semi-centennial of the first railway line in their country and invited representatives of railways from all over the world to attend. The invitation was cordially received and at this meeting there were delegates from 19 countries, representing 131 separate railways with a total mileage of 31,000. The meeting was so successful that several of the delegates conceived the idea of forming an association of those present and arranging to hold similar meetings later on. Among the leaders in this movement was Gaston Griolet, vice-president of the Northern Railway of France, and M. Brame, French inspector-general of roads and bridges. The idea met with success; the delegates gave their approval and a commission was named to carry on the work begun by the first congress and to arrange for a second.

The commission carried out the wishes of the delegates and the second congress was convened at Milan in 1887. Here a constitution and by-laws for the International Railway Congress Association were drawn up and adopted. They have undergone little change since. Congresses have been held, since the one at Milan in 1887, as follows: Paris, 1889; St. Petersburg (or Petrograd, or Leningrad, which is the latest name for this city), 1892; London, 1895; Paris, 1900; Washington, 1905; Berne, 1910; Rome, 1922. Berlin had been selected as the place for the meeting of the ninth congress, which was to have been held in 1915. The permanent commission of the association made the choice at the earnest request of the German government—but then came the war and all prospect of holding this meeting vanished.

The Effects of the War

When the German army invaded Belgium it seized the headquarters of the association at Brussels and suppressed all its activities. The August, 1914, issue of the association's publication, the Bulletin, was seized and withheld from circulation. Not until five years later did the subscribers receive this issue.

When the headquarters of the association in Brussels were seized by the Germans, Secretary Weissenbruch made his way to the Netherlands, where he set up temporary headquarters in the autumn of 1915. Later, however, he went to England and carried on such work of the association as he could, receiving, according to his own statement, sympathetic assistance from Walter Allen, then secretary of the American Railway Association, and from J. E. Fairbanks, who succeeded Mr. Allen upon his death, as well as from Messrs. Griolet and Colson (France), and G. Behrens and Sir Evelyn Cecil (Great Britain).

Reorganization of the Association

With the coming of peace and the return of the Belgian exiles to their homeland, however, the troubles of the association were not ended. Enemy countries had held memberships in the association and, according to Belgian law, this meant the sequestration of all the association's assets by the state. The sequestrator ordered the dissolution of the association and the liquidation of its assets. However, a new association made up of railways from a group of 35 countries, which did not include any of the Central Powers or Soviet Russia, was organized. This asso-

ciation, which, was called the International Railway Association, took over the assets of the old International Railway Congress Association and adopted its constitution, with the addition of a clause requiring affirmative votes of three-fourths of all the members of the permanent commission to permit the inclusion of any additional countries in the association.

The Bulletin of the association was restored to publication and the ninth congress, which was to have been held in Berlin in 1915, actually was held in Rome in 1922. In the early days of the association, congresses were held every two years. It was found, however, that this was too frequent to allow the collection of sufficient new information to justify reports to the congress. Moreover, it did not give the reporters sufficient time to prepare their material and, last but not least important, it was found that it was difficult for railway officers to leave their posts to attend meetings involving travel over such long distances at such frequent intervals. The regular period then became five years, 1895, 1900, 1905, 1910, and so on. The ninth congress was, to be sure, held in 1922—but three years ago. The present one, however, the tenth, at London, puts them back on the regular five-year schedule and this will be adhered to hereafter. The eleventh congress, therefore, will come in 1930.

The official language of the association is French, but it is permissible to use at congresses also the language of the country in which the congress is held. However, as far as the publication of the Bulletin of the International Railway Association goes, English is also an official language. The Bulletin has been published in French since 1886 and in English as well since 1896.

The Last Previous Congress in an English-Speaking Country—Washington, 1905

At the Washington congress in 1905 over 300 delegates from overseas were in attendance. The session was formally opened on May 4 by the Vice-President of the United States, Charles W. Fairbanks, in the absence from the city of President Roosevelt. Addresses at the opening were delivered by Ernest Gerard, representing the Belgian government, who was temporary president of the congress, and by Stuyvesant Fish, president of the Illinois Central and the American Railway Association. In connection with the congress extensive exhibits of railway equipment and supplies were on view. These exhibits were arranged by the American Railway Appliance Exhibition with George A. Post as chairman on arrangements and more than three hundred manufacturers participated. At the opening of the exhibition addresses were delivered by Mr. Post; H. B. F. Macfarland, president of the Board of Commissioners of the District of Columbia; George Westinghouse; William H. Taft (who was then Secretary of War); Paul Morton, Secretary of the Navy; C. N. Lawrence, a director of the London & North Western, and Stuyvesant Fish.

Many social and other entertainments were provided for the guests from abroad. These included sightseeing tours of Washington and its environs, receptions by the Vice-President and by various ambassadors and tea for the women guests at the White House. After the congress the delegates were taken on a tour of the country in four

special Pullman trains. Two itineraries were provided, one for those who wished to go no farther west than Cleveland, and the other a longer one. The railroads issued special passes for the use of the foreign delegates and the American Telephone & Telegraph Company gave the delegates the franking privilege on long-distance telephone calls between certain hours.

A diverting incident at the session, aside from the regular business was an impromptu debate which arose between President Fish of the Illinois Central and Secretary-of-War Taft. Mr. Taft in the course of an address advised the railroads to submit to the government's plans for rate regulation. Mr. Fish objected, maintaining that railway rates should be subject to competition, *laissez faire* and the forces of supply and demand, just the same as prices for other commodities. As the saying goes, a lot of water has flowed under the bridge since those days—which a perusal of the daily editions which the *Railway Age* issued in English and French during the Washington Congress will show. Many of the men prominent in the railway world both in America and abroad at that time have passed on—but a surprisingly large number who were prominent in that day are still more so in this.

The American Delegation to the London Congress

ACCORDING to the best information obtainable at the time this issue of the *Railway Age* went to press, the United States and Canada will be represented at the International Railway Congress in London from June 22 to July 6 by 58 persons. Every effort has been made to make this list final and complete, but last minute changes in plans may cause some alterations before the Congress actually convenes. The list of those who will attend, as it now stands, is as follows:

R. B. Abbott, assistant general superintendent, Reading.
P. R. Albright, vice-president and general manager, Atlantic Coast Line, representing A. R. A.
B. T. Anderson, superintendent of signals, Chesapeake & Ohio, representing A. R. A.
R. N. Begien, vice-president, Hocking Valley.
W. G. Besler, president, Central of New Jersey, representing A. R. A.
George L. Bourne, president, Superheater Company, New York.
B. F. Bush, director, Missouri Pacific, representing A. R. A.
H. M. Cason, general superintendent, Central Pennsylvania division, Pennsylvania.
David Francis Crawford, president, Locomotive Stoker Company, government delegate.
W. C. Cushing, engineer of standards, Pennsylvania, reporter.
Agnew T. Dice, president, Reading.
Fayette Dunn, representing the Railway Mechanical Engineer.
Samuel O. Dunn, editor of the *Railway Age* and consulting administrator of railroad relations of the American Railway Association, representing A. R. A.
S. M. Felton, president, Chicago Great Western, representing A. R. A.
H. J. Forster, secretary and treasurer, American Railway Association.
Edwin B. Gore, executive secretary to vice-president and general manager, Delaware & Hudson.
William E. Grimshaw, representing the Lehigh Valley.
Henry C. Hall, Interstate Commerce Commissioner, government delegate.
W. J. Harahan, president, Hocking Valley.
F. H. Hardin, chief engineer of motive power and rolling stock, New York Central.
G. A. Harwood, vice-president, New York Central.
J. S. Henry, manager, Safety Car Heating & Lighting Company, New York.
R. A. C. Henry, director, bureau of economics, Canadian National.
A. L. Humphrey, president, Westinghouse Air Brake Company, government delegate.

Clarence H. Howard, president, Commonwealth Steel Company, St. Louis.
S. J. Hungerford, vice-president, Canadian National.
F. C. Lavarack, president, Railroad Accessories Corporation, New York.
Col. J. T. Loree, vice-president and general manager, Delaware & Hudson, reporter.
E. P. Mallory, director, bureau of statistics, Canadian National.
Thomas C. McBride, manager, locomotive heater department, Worthington Pump & Machinery Corporation, government delegate.
Charles H. Muchnic, vice-president, American Locomotive Sales Corporation, government delegate.
H. E. Newcomet, general superintendent, Lake division, Pennsylvania.
Frank W. Noxon, secretary, Railway Business Association, government delegate.
Dr. Julius Parmalee, director, Bureau of Railway Economics, representing A. R. A.
F. A. Preston, vice-president, P. & M. Company.
G. J. Ray, chief engineer, Delaware, Lackawanna & Western, reporter.
J. W. Roberts, general superintendent of transportation, Eastern region, Pennsylvania.
Donald Rose, European agent, Central of Georgia.
Frederic Schaefer, Schaefer Equipment Company, Pittsburgh.
Walter F. Schleiter, vice-president, Dilworth, Porter & Company, Pittsburgh, government delegate.
Herman von Schrenk, St. Louis, consulting timber engineer, representing the Nickel Plate.
L. B. Sherman, assistant consulting administrator of railroad relations, American Railway Association, representing A. R. A.
Col. Edward A. Simmons, president, Simmons-Boardman Publishing Company, government delegate.
Harold A. Smith, president, Railway Review, government delegate.
C. F. Smith, general superintendent of passenger transportation, New York Central.
C. M. Taylor, superintendent, Reading Creosoting Plant.
W. L. Tedford, manager, Paris (France) office, Commonwealth Steel Company.
Walter S. Thompson, director of publicity, Canadian National.
Sir Henry W. Thornton, K. B. E., chairman and president, Canadian National.
Samuel T. Wagner, chief engineer, Reading, reporter.
Mrs. A. Fenton Walker, representing the Canadian Railway and Marine World.
G. B. Wall, vice-president, Hocking Valley.
J. T. Wallis, chief of motor power, Pennsylvania, reporter.
A. E. Warren, general manager, Western region, Canadian National.
S. D. Warriner, president, Lehigh & New England.
Rollin H. Wilbur, vice-president and general manager, Lehigh & New England.
Albert E. Wilkes, sales manager, Exide Batteries of Canada, Ltd.
Sidney Withington, electrical engineer, New York, New Haven & Hartford, representing A. R. A.

In addition to these, several officers of the Imperial Japanese Government Railways who are at present resident in the United States will attend.



P. & A.

President Hindenburg of the German Reich Leaving Hanover for Berlin to Assume His Duties

How to Make the Most of a Visit to America

Visitor should make careful plans if he would utilize time effectively—How Railway Age helps

By Brevet-Major F. C. Budden, M. C., R. E.,
Railway Board of India, Simla, India

[Each year scores of railway officers from other countries visit the United States and Canada to observe and study the railways and railway methods of the North American Continent. Such visitors are always welcome. The territory to be covered is so vast, however, and the visitors have generally such a short time at their disposal—at best a few months—that careful planning is necessary if the time available is to be spent to the best advantage. Major Budden visited our shores two years ago; and because of his careful planning he learned, to our certain knowledge, enough about the railways of North America to do credit to anyone who had twice as much time as Major Budden had, or even more, for his sojourn. Since Major Budden succeeded so well in covering in a few weeks, the ground he desired to cover, and since there are doubtless other railway officers among our readers who contemplate at some time or another a visit to us, the RAILWAY AGE asked him to tell just what plans he followed to assure the most effective disposal of his time here. We believe that the points he makes will serve as a valuable guide to intending visitors.—THE EDITOR.]

EVERY officer belonging to a railway outside the United States of America should try and visit America once in his life; not only is the mileage of American railways greater than the combined mileages of those of the countries of Europe and equal to more than one-third of the mileage of the world, but American railways are not frightened of spending money on new ideas and so every officer will be able to find something of interest in his own line.

The following notes are written in the hope that they may be of use to any readers of the *Railway Age* who are intending to visit America and do not know American ways. They are not intended to include all the information a traveler requires as he will obtain most of this from the recognized agents, guide books, etc., and from keeping his eyes and ears open when traveling. There are, however, certain items of information which may be useful and which are usually not readily available.

Read Latest Literature

First of all, every officer who is about to visit America should read the latest books published on the particular forms of American practice which he intends to study. This will save him a lot of time in America and will enable him, not only to concentrate on the points he wishes to examine, but will also save the time of whoever is showing him round, for railway officials in America, as in most countries, are busy individuals.

How the Railway Age Can Help

Secondly, he should try and obtain one or more letters of introduction from friends of his to their friends and acquaintances in America. This will make things much

easier for him when he arrives in America and he will find that Americans are some of the most hospitable people in the world. If he knows no one who has friends and acquaintances in America, he cannot do better than write to the *Railway Age* in New York, informing them that he is hoping to visit America and mentioning the various points of railway working which he is proposing to study. He will be given a ready welcome and much useful advice as to his itinerary and the best railways to visit. He will find at least one associate editor who is interested in the subject he wishes to study and as the *Railway Age* has representatives in several important cities of America, he will be given much useful advice as to what he should do to obtain the information he is after. Personally, the writer visited the *Railway Age* office within a few hours of landing in America and although he had letters of introduction to various high railway officials, he was indebted to the *Railway Age* for much of the useful information he obtained during his trip.

There are also other things which the enquirer after knowledge will have to do before he is ready to start on his voyage. He should reserve a room at some hotel for himself on arrival unless he is going to stay with friends. This he can do direct as some American hotels advertise abroad or through one of the well known agents such as Thomas Cook & Son. The latter is probably the better way as the same agents will arrange to supply him with money during his stay in America and give him many valuable tips on what to do and what not to do.

Flimsy Trunks Will Not Do

The selection of trunks is another important item. A passenger traveling by train is allowed to take with him in the carriage, or passenger car as it is called in America, only a small suit case or handbag. All the rest has to be booked. Only an American trunk or other stout trunk or box will stand up to the hard usage in the baggage car and it is far better to buy one before starting. The writer's compressed cane trunk which had traveled to the Far East and back more than once lasted exactly one trip. After that the writer bought an American trunk.

Clothes are a matter of individual choice, but it should be remembered if the trip is made in winter that all the houses and passenger cars are steam heated and warm suits and underclothing required for winter in England are not necessary. A good overcoat is essential.

The traveler after probably having received from kind friends who have never been in America much advice, most of which is quite untrue, will be ready to start on his voyage. If he is accustomed to traveling to the East, he will find many differences on the palatial liners which cross the Atlantic to what he has been used to before, but if he keeps his eyes and ears open, he will soon settle down. The voyage across the Atlantic is so short compared to voyages to the East, Australia or South Africa

that there is no time to waste and passengers get together in a remarkably short time.

The Express Companies' Service

After having arrived and having passed through the customs, he will have all his baggage sent through an express company to his hotel and set forth himself with not much more than his grip. The Americans have an excellent system of express companies which take over your baggage from the house or hotel you are staying at and deliver it to whatever house or hotel or town you are making for. The charges are reasonable, the service is excellent and if the baggage is sent off a few hours before you leave, it will probably be waiting for you on arrival. It is possible to book your own baggage by train but the saving is small and the extra worry is considerable.

It is generally a good thing to get a small map of the larger cities on arrival. Most of these are laid out on very regular lines and the streets are numbered consecutively. With the help of a map, it is quite simple to find your way to most places.

Follow the Crowd

The underground railways in New York are very confusing to anybody accustomed to the underground lines of London, as they lack the direction boards and notices so plentiful in London. It is very difficult to make out where any particular train is going to and if it is a non-stopping or a stopping train. The traffic control in the streets, however, is excellent and the visitor if he values his life, is strongly advised to follow the crowd. New York has to deal with such a dense traffic due to its skyscrapers that it is only by a very strict traffic control that it is possible to carry on.

There are many interesting sights to see in most cities and one excellent and cheap way to find out what is worth seeing is to take a seat in one of the personally conducted tours which are found in most places and become a "rubber-neck" for a time. The visitor can then later on revisit at his leisure the places which attract him.

A Few "Don'ts"

There are certain other points which all railway officers should bear in mind when visiting America and these can be best expressed by "don'ts."

Don't criticise. There is generally some good reason for doing most things and nobody likes being criticized by a new comer.

Don't worry if people laugh at some of your questions. They are generally laughing with you and not at you.

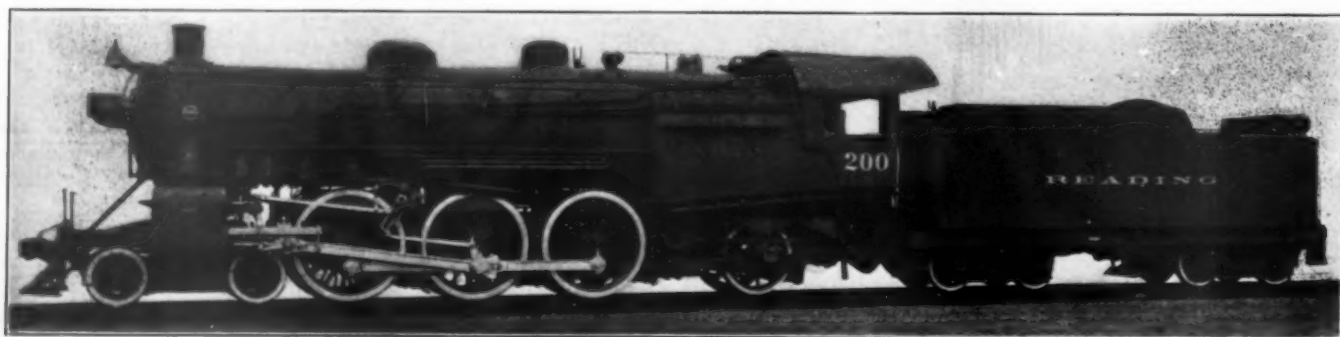
Don't think that every word means the same thing among Americans as in English. If you keep your eyes and ears open you will soon learn the words in common use which have different meanings to those used by Englishmen.

Don't be stand-offish. Theoretically every man is equal in America.

Program for the Centennial Celebration

THE actual date of running the world's first passenger train between Darlington and Stockton was September 27, 1825, but as it was desired to hold the International Congress at the end of June the celebration of the centenary has been advanced three months to allow delegates to the Congress an opportunity of participating in the celebrations. The three days' program in the area which saw the birth of the passenger train will, says the Times (London) be opened on July 1, when the Duke of York, who, with the Duchess of York, will take part in the various ceremonies, will open at Darlington an exhibition of locomotives, rolling stock and material representing the development of railway transport during the past century.

On the following day there will be a procession over the old Darlington and Stockton route of old and modern locomotives and rolling stock, which will include "Locomotion No. 1" built by George Stephenson, drawing a replica of the train carrying 450 passengers which it hauled between Darlington and Stockton, a distance of 26 miles, on September 27, 1825, at the opening of the line. Another item in the procession will be a train composed of flat cars on which various historical railway tableaux will be presented. In contrast with the ancient rolling stock and locomotives will be specimens sent by all the different companies of the modern cars and trains now running in the British Isles, complete with engines. It is estimated that the procession will be approximately six miles in length. The Duke and Duchess of York will witness the passing of the procession from a grand stand near Eaglescliffe, and they will subsequently be conveyed by special train to Stockton, where they will be entertained at luncheon in the Borough Hall by L. Ropner, the Mayor of Stockton. On the evening of July 2 a banquet will be given in the new Faverdale Wagon Works at Darlington, specially adapted for the occasion. It is expected that this banquet will be presided over by the Viscount Grey.



A New Reading Passenger Locomotive Built by Baldwin

One of 5 built to railroad company's specifications; Cylinders 25 in. by 28 in.; Working pressure, 220 lb.; Driving wheels, outside diameter, 74 in.; Weight in working order, engine only, 288,120 lb.; Tractive force, 44,200 lb.

Mechanical Department Possibilities

*Drifted for a while, but must now meet changed conditions
in a big and positive way*

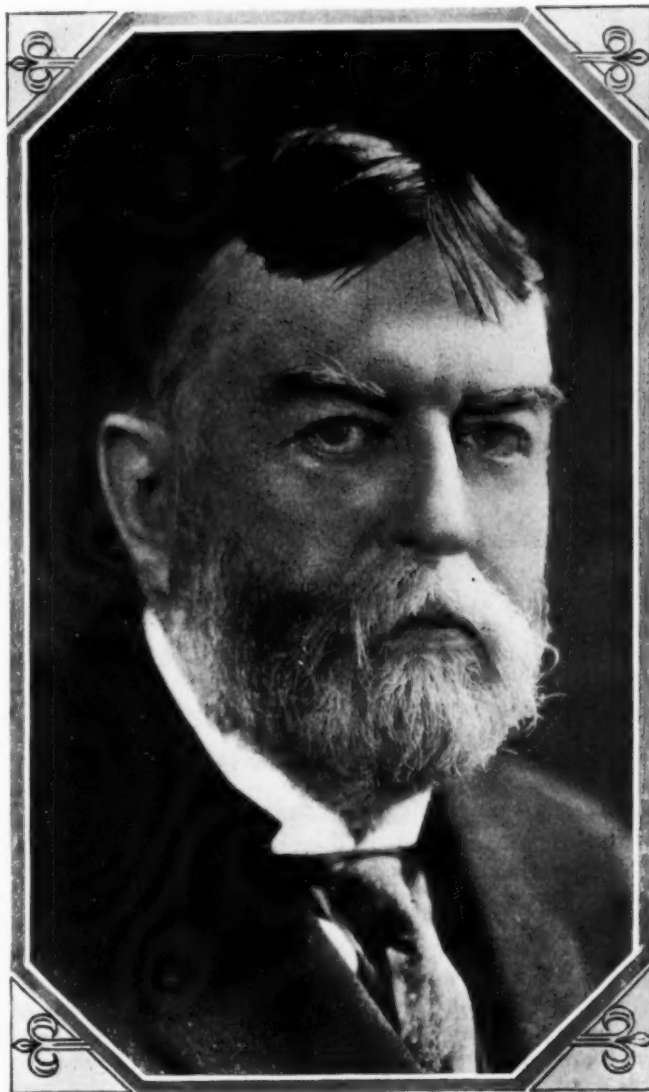
By L. F. Loree
President, Delaware & Hudson

THERE was toward the end of the last century a great impetus of mechanical development—a great increase in the size of the locomotives and great improvement in devices and essential parts; a like growth in the size of freight cars, new materials used and new forms and arrangements in the details of construction. Then for a long time we drifted.

We now find ourselves involved in a great evolution, arising out of the World War and the new industry of the auto vehicle. Many old customs are passing out; great changes are forming in our surroundings. We are feeling this creative impulse. It awakens the mind, incites new ambitions and efforts; unused resources are developed to aid in the readjustment. What may we look forward to in the Mechanical Department?

Our dispatchment and back shop facilities call for comprehensive overhauling—the advance inspection pit and the twin-span turntable avoiding the time lost in spotting and balancing the locomotive; the enlargement of the enginehouse, including overhead and portable crane service and hot water washout systems; improved locomotive inspection, supplying and handling facilities. Adequate and suitable provision should also be made for modern power, heating, and light equipment by means of the 100 per cent drop light and back wall reflector lamps, with the discarding of the smoking torch. Adequate, commodious and comfortable toilet, sleeping and commissary accommodations should be provided for engine crews.

The machine shop should be equipped with modern material handling and storing facilities, cranes and tools, especially grinding, cutting, and welding devices, replacing perhaps 80 per cent of the old installations—doubling



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L. F. Loree

the output and decreasing the cost of production fully 25 per cent; improved heating and ventilation, the organization of supervising and working forces, signaling and communication throughout the entire plant, and the classification, storing, handling and accounting of new, second-hand, and scrap materials, and all possible economical reclamation and re-use of the latter.

Our locomotives are destined to marked changes—higher steam pressures, water tube types of boilers, four-cylinders with outside connecting rods and valve gear, multiple expansion of steam, poppet valves, feed water heating, more effective superheaters and fire brick baffle walls, pulverized fuel, auxiliary locomotives or boosters, use of high tensile alloy steel castings and forgings, a great reduction in the fuel now used, and a large increase in tractive effort and sustained drawbar horsepower and in the ease and certainty with which the train is started, accelerated and moved.

Freight cars, their capacity still further increased and tare weight reduced, their useful life prolonged through the use of corrosion resisting alloys, their dimensions standardized, and their multitudinous parts reduced and made more simple and interchangeable. The march in equipment improvement should keep pace with that in the shops and enginehouses, last longer and go farther.

And more even than in these matters may we look for results through the improvement in the living forces. For the first time in this century there is now discipline in the force. The habits gained by a course of training, willing obedience, intelligence, self-sacrifice and the rest, have become a second nature. Mutual confidence has been re-established; the response to suggestion is imme-

diate. Co-operation in management, sometimes fanciful and always of limited scope, is exemplified in the return to piece work and individual effort, where the employee substitutes his self-control for the oversight of the foreman or, if the work is done in gangs, they devise methods, co-ordinate their efforts and achieve results upon their own initiative.

Wages now compare, and can be kept favorably comparable, with those in allied industries, and are augmented by an intelligent recognition of seniority rights, free transportation, and the additional perquisites peculiar to railway employment.

So we have come again into an era where, if we have the wisdom to avail of it, we may "live the good life," so dreamed of by the philosophers. All may acquire a good education, secure friends, love their families, bring up their children to industry and in the fear of God, be secure in the continuity of their employment and free from the five great hazards of life through group insurance and the pensions, the while occupied with work that is useful to mankind and in itself full of interest. Never, to my mind, has the outlook seemed so favorable. Let us never forget that it is to be held, like liberty, at the price of unceasing vigilance.



Mechanical Officers Look Ahead

Expressions from several as to the more important tendencies in the department

THE mechanical department is fast coming into a new and larger field of endeavor. For many years it was regarded more or less as an unproductive factor and was tolerated as a necessary nuisance.

It is not always pleasant to think back over the days when our country entered the World War. One truth was driven home, however, from the very outstart, and that was, that more and more attention must be paid to the maintenance of rolling stock and equipment if the roads are to be in a position to operate with the greatest economy and efficiency and to meet successfully the demands which may be made upon them under peak loads. This tended to dignify and enhance the position of the mechanical department, although there is some question as to whether mechanical officers fully recognized this change of attitude and were keen to take advantage of it.

President Loree has pointed out in a few words, considering the largeness of the subject, along what lines the mechanical department can develop in order to function to the best advantage. We also asked a few heads of the mechanical department to point out certain possibilities which should receive the attention of progressive mechanical department officers at this time. Combined with Mr. Loree's suggestions they present much food for thought and consideration.

Among other problems which might well have received consideration are the greater utilization of locomotives—a subject which has almost untold possibilities. Then there is the problem of the more efficient operation of locomotives,

Directing the mechanical department is a business proposition of no small size and involving many complications; to control it to the best advantage demands carefully and intelligently devised statistical and accounting information. Some progress has been made in this direction by a few roads—the question, however, deserves greater recognition.

The locomotive terminal situation—always important and too frequently neglected—demands more and more consideration with the lengthening of locomotive runs and the splendid progress which is being made in securing greater service from the locomotives.

Questions of leadership and employee relations have been emphasized by Mr. Loree and some of the mechanical department officers. This field of endeavor, however, contains such great possibilities that we cannot let the opportunity pass by of emphasizing certain phases. It is doubtful whether any single effort will be any more productive than that of a program which will insure a larger degree of stabilization of employment in the mechanical department. Fluctuation in the forces is extremely costly in the final analysis.

The question of materials presents many interesting and attractive possibilities, particularly when it comes to reducing the weight of the rolling stock, particularly of the locomotives. What must the mechanical department do to provide the facilities and equipment properly to take care of the various kinds of alloy steels which are fast coming into use, and which will make necessary a revolu-

tion in smith shop practices? What will the use of Duralumin or similar materials involve on freight or passenger cars? What will it mean to the railroads if corrosion resisting materials can be found for steel car parts?

What part can the mechanical department play in helping to standardize the equipment used on electrified parts of the steam railroads, in order that the electrification project as a whole may be co-ordinated so far as may ap-

pear to be justified? To what extent can the Diesel engine be satisfactorily applied to locomotives?

We have absolute faith in the mechanical departments of our railroads, but we submit that they are confronted with no small problem, and that it will require every bit of ingenuity and effort which they possess if they are fully to qualify for that high position in the railroad organization which rightly belongs to them.

How the Mechanical Department Can Reduce Expenses

By E. J. Brennan

Superintendent Motive Power, Chicago Great Western

OUR UNDERSTANDING on the Chicago Great Western is that there is one great task to be performed, and as it is too much for the one managerial head to accomplish, he allots the duties of engineering to a part of the organization, the duties of maintenance of rolling stock to another, and of roadway and structures to others. They are so inter-related, however, that there is no thought of division of responsibility.

We of the so-called mechanical department are to perform whatever duties are entrusted to us by the general in charge—the general manager—and should such duties have features that are considered by some companies as operating matters we perform them just the same. Where the mechanical department is a separate entity independent of the operating department, we can understand why there would be friction and a definite drawing of the line between “mine and thine” but fortunately through our integral organization we work together happily, congenially, and efficiently, to give service to the public at the minimum of expense to the owners of the property—the stockholders and bond holders.

Each of us is charged by the leader of the organization to bring to his attention and to work out for ourselves new conditions and practices which will keep the performance up to the requirements of the times. In connection with this duty the national trend of events brings to mind opportunities to reduce the cost of operation and assist in competing with automobiles, trucks, and airplanes, for the transportation business of the country.

Some of the opportunities to lower the expenses are as follows:

1. More intensive utilization of existing facilities and equipment.
2. Introduction of new devices.
3. Correcting wasteful shop practices.
4. Reclamation of material and economy in its use.
5. Elimination of unnecessary repairs.
6. Safety work.

More intensive utilization of existing facilities: Longer runs for locomotives will cut down the number required and eventually bring a higher grade of inspection which, as we all know, is the best insurance against failures and delays and will cure the trouble at the start. Shopping equipment promptly will cut to the minimum the number of days out of service. Keeping the equipment in service and the longer locomotive runs will increase the number of miles per locomotive or car day, which is unquestionably as beneficial as the

addition of thousands of dollars worth of equipment and much cheaper.

Working of machine tool facilities two and sometimes three shifts brings the desired output with a much smaller expenditure for machinery and for housing facilities.

Introduction of new devices: These may be divided into two classes: new devices for rolling stock, and new devices for shop use. The various inventions which have come into use lately for application to the locomotives, such as feedwater heaters, steam flue blowers, syphons, etc., have shown their efficacy in the saving of coal, and have thus indicated to the thoughtful observer that there must be other as yet unknown ways of effecting still greater economies. The installation of improved draft gear, substitution of cast steel for cast iron, and other improvements on passenger and freight cars, have indicated that the cost of maintenance of this equipment can be cut down.

The introduction of light, cheaply operated units for passenger service, such as gas-electric and gasoline cars, should help to reduce the cost per passenger transported.

Installation of modern labor-saving machinery in shops, roundhouses, and on repair tracks will cut down the costs for maintenance, but care should be used to see that there is an actual net saving greater than the interest on the investment plus the depreciation of the new equipment, and also that the work could not have been done by more intensive use of other equipment.

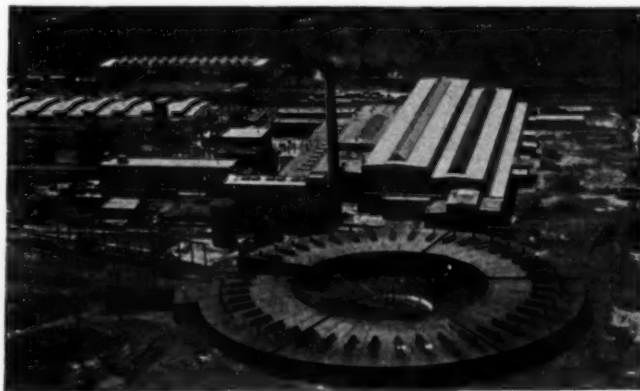
Elimination of wasteful shop practices: The first step to reach this goal is in the direction of a careful weeding out of the organization, particularly the supervisors, to get rid of the dead timber, and get an interested, ambitious, intelligent force and therefore an increased output for each man-hour. The machines should be experted to see whether they are speeded up as much as is practicable.

The shop scheduling system must first be made correct and then lived up to religiously to avoid duplication of effort.

The forces in the various departments should be co-ordinated so that delayed work in one will not cause unnecessary expense in another. Repairs at roundhouses

must be only such as can be made economically with the facilities available at such points. Heavy repairs should be made at shops where the crane facilities can be used for handling the equipment and materials.

Reclamation of material and economy in its use: Probably one of the greatest wastes on a railroad is in the use of materials. The men who actually apply the materials to the equipment or burn fuel in loco-



motives have no direct financial interest in them. It is just as easy to write an order for a \$1,000 cylinder as for a broom, and there is a tendency to use the new material when the old is still serviceable—the lines of least resistance. To overcome the tendency to such unprofitable practices on the Chicago Great Western the management allotted the responsibility for requisitioning or ordering of material for new equipment and maintenance of equipment to the mechanical department in the belief that no one knows as well when and why such materials are required as those who have been trained during their whole business lives in the use of just such material, both as to quantity and quality. In this connection, it might be interesting to check the amount of stock per mile of the various railroads or the percentage of the material stock to the gross earnings. Keeping the stock of material at the lowest economical point consistent with successful operation will effect a tremendous saving, not alone on the interest in capital tied up and in depreciation of the material, but also in the cost of handling.

Elimination of unnecessary repairs: This refers particularly to the shopping of power when it could be continued in service for some time. Keeping the master mechanics in close touch with the power given them to maintain, the maintenance of complete records of the repairs made at various points so as to avoid duplication, and a record of the service and shopping of the engine will keep out of the shop equipment that has no right to

be there. In this connection, we have experimented with the thorough inspection and repairs at the monthly inspections, and have found that it discloses the defects which the engineers fail to report and cuts down the running repairs which must be made during the rest of the month. The monthly inspection referred to enables us to turn our locomotives in very short time because we know from the monthly inspection the actual physical condition of the locomotive. It would be hard to compute the number of engine hours and days which have been saved by this practice.

Safety work: It has been demonstrated that it is not necessary to use unsafe practices to be efficient, and, in fact, the safest workman is usually the best. Payments for time lost and for suffering on account of injuries constitute one of the heaviest overhead or non-productive expenses of the railroads. The injuries are not only non-productive but they are destructive of production. Most of them are entirely unnecessary and can be prevented by carefulness, and correction of wrong conditions. Well conducted safety campaigns will reduce this expense to the minimum.

All of us are aware that conditions are changing very rapidly these days, and that we must be on the alert for new ways of accomplishing our work in an easier, cheaper and better manner, so that we may do our part in helping the railroads meet the competition of the other forms of commercial transportation.

Possibilities of the Internal Combustion Engine

By C. E. Brooks

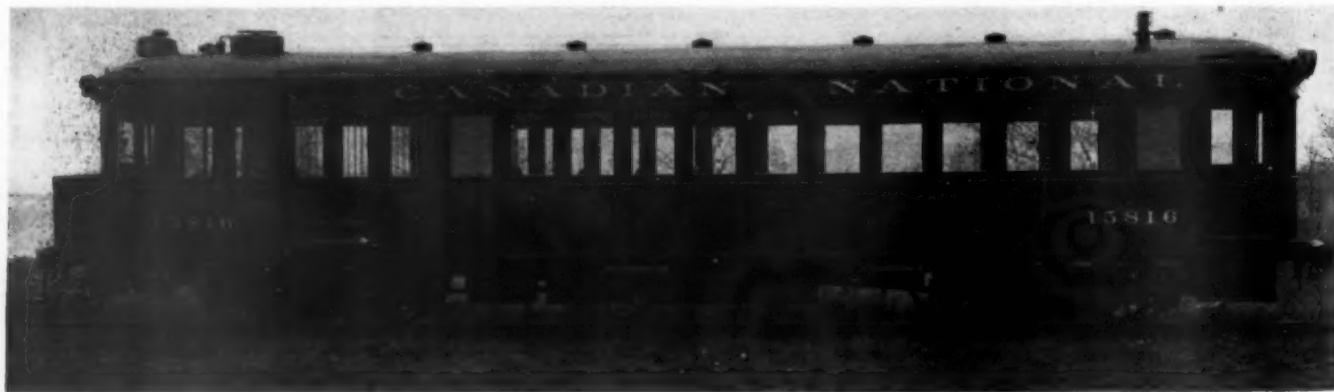
Chief of Motive Power, Canadian National

ALTHOUGH it may appear to those interested in the study of transportation problems that we are just commencing the use of the internal combustion engine for means of propelling cars or locomotives, the idea is not correct. We must go back fifteen years or more to find the first extensive applications to railroad work in the form of gas-electric cars of about 100 hp., accommodating up to 60 passengers and baggage.

The internal combustion engine of that date developing 100 h.p. was of a cumbersome and inefficient type, very difficult to start and more difficult to maintain. In spite of these serious disadvantages, a recent check made of all the cars of that type built, indicated over 60 per cent of them still in service and saving money over steam operation in the particular services in which they are engaged. The gasoline consumption of these engines is as high as .5 to .65 gal. per car-mile, or figuring on gasoline as 20 cents per U. S. gallon, from 10 to 13 cents per car-mile. Added to this is a correspondingly high lubricating and repair bill.

The development of the automobile and motor truck engine for highway work evidently distracted all attention from further development for railroad motive power until it became apparent about 1920 that serious inroads were being made in railroad passenger earnings by motor busses and that a lighter form of railroad train would have to be developed to meet this competition and to replace costly branch line operation where receipts were small.

Since about 1920 marked progress has been made in the adaption of the gasoline engine to railroad motor coach propulsion in conjunction with both mechanical and electrical transmission of power to the wheel. Influenced by the expensive experience of the gas-electric cars referred to previously, the tendency for the first few years has been to develop cars of such limited capacity and such poor riding qualities that regardless of how efficient the engine may be, the unit as a whole could never successfully replace the steam train except for short transfers or where service is very limited. Small cars operated by auto truck



type engines of from 60 to 90 h.p. have been much improved recently and for passenger capacity up to 40 persons and for distances up to 50 miles we may expect a very considerable development. The operating costs of such equipment with two-man crews should not exceed 20 cents per car-mile for runs of over 100 miles per day. Where over 200 miles per day is made, operating costs of as low as 13.0 cents per mile are being shown on certain classes of service. Experience indicates it advisable to write off as depreciation the cost of engine and transmission every 200,000 miles if reliable service is to be maintained.

Reliable and economical as is this equipment, the railroads cannot hope to get back any more than a small percentage of the traffic lost to the highway bus—the only explanation being that the public prefer highway travel for short distances, provided the bus is of the modern luxurious type and the highway is in reasonably good physical shape. For this reason I can see no abnormal increase in the use of the 60-90 h.p., gasoline motor for railway service beyond short transfers and runs of less than 50 miles where highway competition is negligible.

To provide for a higher class of service than that just described, the railroads are offered today cars of approximately 60 ft. length, having power plants of from 160 to 250 h.p. and capable of maintaining high speed (50 to 60 m.p.h.) as a unit car and of hauling a 60,000 lb. trailer at branch line passenger schedule speed and conditions. Such equipment can successfully handle long branch line runs or frequent runs on high speed lines. No doubt the tendency is to couple the internal combustion engine of this capacity to electrical equipment, it being figured that the greater utility of the gas-electric equipment for starting and primary acceleration and its smoothness of operation far outweigh the lesser first cost and simplicity of mechanical transmission.

The question as to whether this power plant will be gasoline-electric or Diesel-electric has not yet been settled due, perhaps, to the fact that there has been little or no advance in the construction of the light weight Diesel engine on this continent. The Diesel-electric cars operating in Sweden have engines weighing from 50 to 100 lb. per horse power and develop power for approximately .42 lb.

fuel oil per b.hp. hour. Until such time as an oil engine of much less weight and thorough reliability can be developed, it does not seem that we can expect railroad engineers to risk the heavier initial expenditure on a type of engine with which they are not familiar.

Provided that the question of weight can be satisfactorily settled there is without question a net saving in fuel costs of from \$3,000 to \$5,000 per year per car in favor of the fuel oil engine operating over 60,000 miles annually. One large railroad, convinced that the future of this type of equipment depends on low power costs, is building a considerable number of cars fitted with Diesel-electric power plants with engines weighing (approximately) 13 lb. per b.h.p.

Regardless of which type of engine is universally used, the reliability of modern gasoline or Diesel-electric power units ensures a great increase in the number of these cars in operation. Their size and speed capacity will enable the replacement of branch line equipment with a saving in many cases of as much as \$1.00 per train mile. Active competition to bus lines will be ensured on important high speed lines by running frequent service in place of the more expensive steam local train service.

There is also the strong possibility of unit equipment, such as European articulated cars, with power plants of about 400 b.h.p., fulfilling all the necessary functions of present high speed interurban service, thus postponing indefinitely the extension of electrification. The economy of such equipment depends on the development of the light weight oil engine, and provided this is accomplished it is reasonable to expect this form of equipment to be used to a great extent in branch line, light suburban and interurban work. The advantage of such equipment lies in being able to house the power plant in a part of the unit from which engine noise, etc., will not be transmitted to the passenger, and coincidentally provide the greatest passenger accommodation per unit of weight.

In conclusion it seems safe to predict a substantial increase in the use of the internal combustion engine in railroad work—a development limited only by the ability of the American manufacturer to develop the light weight oil engine.

Keep the Machine Tools and Shop Equipment Up-to-Date

By C. L. Dickert

Superintendent Motive Power, Central of Georgia

IN 1910 the Central of Georgia completed and put in operation modern locomotive and car shops at Macon, Ga., which is the most central and, therefore, the most logical location on the system, particularly for handling heavy repairs to locomotives. At the time these shops

were opened, a majority of the machine tools were new and since that time certain additions and replacements have been made, the obsolete tools being retired to make way for more modern tools.

Our shop supervisory forces keep posted on all types of



machine tools and are, therefore, in a position to make recommendations when new tools are purchased. It is our intention to keep our shop tools as modern and as up-to-date as possible, and, with that end in view, we have, for the last three or four years, spent a considerable amount of money on new tools. Each tool desired is studied carefully with a view to getting the very best that can be bought—both from a production and maintenance viewpoint—and we expect to carry out our purchasing program until we have our shops completely equipped with the most modern tools obtainable. We expect to accomplish this in the next two years.

In order to keep this equipment modern, it is necessary to keep well posted in regard to the improvement in machine tools in general. Our aim is to know every machine in the shop and what it can do as compared with a new tool of the same type for quantity production at lowest cost. Of course, this may not be literally true in every instance as there are a number of machines in every shop, particularly railroad shops, that are not used often enough to be put on a production basis, yet they are necessary and do not have to be replaced as often as machines which are in constant and daily use. We feel that the expense of

replacing machines of this class, which we will say are used approximately 50 or 60 per cent of the time, is not justified as the interest on the investment will more than offset the economy effected, yet they are necessary to handle certain operations. We do feel, however, that it is a paying proposition to replace certain machines which are in daily and constant use at the end of eight or ten years as the improvements made by the manufacturers in this length of time and the constant use of the machines in service has rendered them inefficient and unfit for the service required.

I might mention a few machines which, in my opinion, this applies to and which should be kept as up-to-date as possible. I refer to such tools as planers, shapers, all types of lathes from driving wheel on down to portables, boring mills, drill presses and turrets. There are many special tools for doing certain things, the necessity for which is governed by local conditions, but in the end the shop with the modern machinery and the active thinking supervisory forces is the one which will turn out the most work at lowest cost. Therefore, we have expended a great deal of time and thought, as well as money, on our shop tools to get as nearly as possible the conditions enumerated.

Helping the Mechanical Department Foremen

By W. O. Foreman

Mechanical Superintendent, Boston & Maine

THE MECHANICAL DEPARTMENT of the Boston & Maine has a payroll of approximately \$900,000 per month. The monthly expenditure for materials used averages about \$675,000 per month (no credit is allowed in this figure for second-hand and scrap material released). The operations involving these expenditures are in direct charge of approximately 260 foremen and assistant foremen. Thus on an average each of these supervisors has direct charge of work involving an expenditure of approximately \$75,000 a year.

The results obtained depend to a very considerable extent on the foreman's ability. It is, of course, always recognized that the quality of the individual workmen is of first importance, but the efforts of a first-class gang of men can only reach their full effectiveness when guided and co-ordinated by a skilled and competent leader. This need is greater perhaps in a railroad repair shop than in most other lines of industrial endeavor.

In the up-to-date manufacturing plant, the operations are generally repetitive and standardized on a quantity

production basis. Each workman knows exactly what he is expected to do, and the principal duty of the foreman is to see that he performs according to schedule. In a railroad repair shop or engine house, however, conditions are constantly changing. No two locomotives or cars require exactly the same repairs. Here the supervisor must use judgment as to what should be done. He must so assign the work to the men under his charge that they may work together effectively. He must give them necessary instructions and be constantly on the lookout for means of saving labor and material, and with it all he must so conduct himself that his men get a square deal and are conscious of that fact, and at the same time see to it that the company gets a square deal in the matter of work performed.

All of this is stated to show the important position which a foreman holds in the organization, and that the wise executive must give a lot of thought to the question of their selection and training. In selecting a foreman, consideration is given to the candidate's qualifications,



both as to his knowledge of the job and his ability as a leader of men. It is not always the fastest workman who makes the best foreman. Sometimes it works out just the reverse.

The training of the foreman must be taken care of largely by his immediate superiors,—the general foreman and the shop superintendent. A shop official who does not give time and thought to this question is failing to cover his job in the fullest sense. Too often this instruction is largely confined to the technical part of the job, and very little thought is given to training in the leadership end of the game. This is a serious mistake. Our foremen should be given authority to correspond to their responsibility and be assisted and instructed by their superiors in all matters which will make their work more effective.

A second effective means of assisting the foreman is the checking and instructing done by the staff officers of the department. Neither the foremen nor the local managers like to be caught in an error by a man from headquarters. Great care is taken by these men to explain to the local people everything that is to be reported to headquarters. This is very important as they would otherwise be regarded with some suspicion. Their purpose is as much to assist the local people as it is to collect the information required at the main office.

A third development on the Boston & Maine which has

been very helpful to the foremen and to the company is a series of foremen's clubs, which have been organized for educational and social purposes. These clubs meet once a month. Each meeting is addressed on some topic of the foremen's own choosing, either by one of their own members, or by a speaker supplied by the company. The main paper is followed by a general discussion of the subject in which all who care to may take part. The subjects chosen vary from the broad questions of leadership to the more technical and mechanical questions involved in their work. It has been interesting to watch the effect of some of these meetings upon the phase of the work discussed. In some cases, very notable improvement quickly followed.

During the past twelve months on the Boston & Maine better shop and engine house work has increased the mileage per engine failure by 175 per cent. At the same time, the average mileage since last shopping for engines going to shop for classified repairs has increased about 50 per cent and a decrease in cost of repairs per locomotive mile of 15 per cent (1924 costs compared with 1923). An equally creditable showing has been made in the car department. There are, of course, many elements which have assisted in producing this result. The loyal and enthusiastic efforts of our workmen have been a very large factor, but the results could not have been attained without the equally loyal and earnest work of our foremen.

The Locomotive and Its Relation to Track Stresses

By John Purcell

Assistant to Vice-President, Atchison, Topeka & Santa Fe

THE constantly increasing demands for greater power, economy and serviceability of locomotives are being met by locomotive designers with a considerable degree of success. In achieving this success, however, various improvements and accessories have been introduced which not only increase the total weight of the locomotive, but in many cases all of the additional weight must be carried by certain pairs of wheels, usually the trailer, unless additional wheels are introduced. Any increase, either in the weight carried on certain pairs of wheels, or the total number of wheels under a locomotive, necessarily changes the effects of the locomotive on the track and introduces problems which should be considered individually for each new design of locomotive.

Much has been accomplished in the way of betterments and devices for improving counterbalance, regulating

lateral motion and resistance of trucks and driving wheels to lateral displacement on curves. As a result of investigation of stresses produced in the rails by various wheels of a locomotive as they pass over them, by study and modification of the distribution of weights over the various pairs of wheels, these stresses have been reduced without detriment to the locomotive. Four-wheel trailer trucks are beginning to be introduced in locomotive design largely on account of the excessive weight that is being added to the latest designs of locomotives. These trucks are advantageous not only for the purpose of reducing loads on individual pairs of wheels, but they also reduce the space between wheels which has been found to be beneficial in reducing rail stresses. Much remains to be done along all of these lines.

The causes of rail failures are being very thoroughly



studied by several engineering societies and bureaus, particular study being given to the class of failures known as transverse fissures. The effects produced by locomotives and cars while passing over the rails are important factors in the production of these failures, and the mechanical departments are vitally concerned in these studies.

More or less trouble is experienced on all railroads with derailments, kinked rails, and similar troubles for which the track and equipment may be jointly responsible. In too many cases the engineman probably comes in for a little more than his share of the blame for exceeding

speed regulations. In all cases of this kind, careful attention should be given to all details of track and equipment that may have in any way contributed to the difficulty, and joint investigation by competent representatives of the engineering and mechanical departments may be highly beneficial in some cases. In any event, careful attention should be given by the mechanical department to the condition of all equipment involved, particular attention being given to condition of shoes and wedges, counterbalance, lateral motion devices used on front and trailer trucks, driving wheels, etc.

Economics Underlying Car Maintenance and Retirements

By L. K. Sillcox

General Superintendent Motive Power, Chicago, Milwaukee & St. Paul

ONE of the largest problems with which carriers are now confronted is greater utilization of equipment, materials, man-power and facilities. In referring to the matter of facilities it can be quickly appreciated that this feature not only involves more mileage and more tonnage with fewer units of equipment, but also takes into account the question of advance in design to attain greater service. It may be assumed that design and utilization are relative in that the production of satisfactory construction must naturally keep pace with the development in the use of facilities. In order that these features may be advanced in proper relation to each other, there should be a thorough knowledge of the rate at which obsolescence accrues or exists in any given property, knowing that it will generally require a term of years in order satisfactorily to dispose of practices and establishments which may have been in force for some time.

In the case of locomotives and cars, the full utilization is not entirely a question of mechanical administration, but depends very much upon other factors, such as road, yard and terminal facilities, water supply, availability of passing tracks sufficiently long to meet modern tonnage requirements, road and grade conditions, efficiency of train loading and dispatchment, the proper classification of trains with a view toward specializing the work of moving, etc. In general locomotives are capable of performing more hours of service and attaining a greater mileage per day than is now accomplished. Freight cars can be made to render more miles per car per day and be maintained so as to be in service more continuously than is now evidenced. Locomotive performance may be such as to attain a proper result from the use of fuel and water,

and, yet, other elements may prevent a greater utilization thereof. Every carrier is confronted with the problem of proper spacing of engine and car terminals in relation to obtaining longer runs or a maximum utilization per day for all classes of equipment, with consequent speeding up of average train movement.

The problem of proper car utilization and maintenance, (especially freight cars) is not solved merely by low unit cost of repairs or even by a large car supply. For instance, if 60-ton box cars will carry the prevailing grain tonnage, they should be employed to save track room as well as detailed maintenance and make it possible to profitably retire two old cars for one new unit. If a uniform, but economical unit cost is to be attained constantly, it is necessary to consider the rate at which obsolete cars are retired and new ones are acquired to maintain a proper complement of equipment. Obsolescence is a vital feature and must be controlled in relation to the advance in requirements and design. It is overcome by the purchase of new equipment of modern proportions and construction on the one hand, and it is also met, to a certain degree, by overhauling and improving existing cars and thus overcoming partial obsolescence, which formerly made equipment unfit for intensive handling. By utilization is meant the miles run per car per day, the days serviceable per year, and the tons hauled per day. If new and overhauled cars are not of modern design, the object to be attained is not accomplished in the full sense of the word. In order to arrive at greater utilization with an economical maintenance cost, the mechanical officers should have a full knowledge of performance of such equipment, and especially should obsolete freight car maintenance facilities



be visualized with a view toward applying a factor with respect to adverse weather conditions slowing up the availability of cars when needed, because we cannot treat the modern expensive unit in the same light with the older design of car which ran on roadway and through terminals, representing in no sense the cost to construct, maintain and operate as at present.

It is not sufficiently appreciated how much available track room is being taken up by cars not worth the parking space on the modern railroad, and if the facilities are inadequate or cannot combat inclement weather, then the modern car which represents a comparatively high investment is unduly detained for repairs because of the restricted repair track space occasioned by the presence of obsolete cars or inadequate facilities.

Freight car service should be analyzed as to ownership,

type, age, use, etc., and a maintenance policy ought to be adapted thereto. This requires complete records by series of cars according to design and characteristics. Any maintenance policy should take into strict consideration the problem of utilization, having in mind allocation of existing equipment to available character and class of business in so far as is economically possible; then it becomes a problem of such units as cannot be successfully assigned either to be retired or rehabilitated at a known expense less than that of new cars. Lastly, mechanical performance records should be revised throughout the country to fully express the utilization intended, because most of the figures employed at this time are fashioned after old practice and do not reflect a true picture, and unfortunately many mechanical officers are placed on the offensive unnecessarily as well as improperly.

Locomotive Fuel Must Be Conserved

By Charles J. Scudder

Superintendent Motive Power & Equipment, Delaware, Lackawanna & Western

THE RETIREMENT of locomotives of the older types and light tractive effort and replacement with units of heavy tractive power, the application of fuel saving devices of various kinds and the intensive instruction of employees on fuel conservation resulted in a most favorable showing in 1924 as compared with preceding year. The best statistics available indicate a decrease of 12 pounds of coal per 1,000 gross ton-miles in road freight service, 1.1 pounds per car-mile in passenger service and a substantial decrease in all other service, the total saving in all classes of service amounting to \$29,500,000.00.

Fuel for locomotives being the largest single item of expense incident to locomotive performance and operation, naturally deserves a first position of importance with respect to selection and attention by executives and supervisors. Fuel should be selected that will best meet the requirements of the service—cost, quality and base of supply being duly considered. Selections should be made on the basis of laboratory tests and actual service tests. The service tests should consist of a sufficient number of runs to secure a fair average figure for pounds of coal used per 1,000 ton-miles, evaporation of water per pound of coal and pounds of ashes accumulated; special consideration should be given to the necessity of shaking grates, cleaning fires and dumping ashpan.

After selections have been made and fuels contracted for, frequent inspections and tests should be made, so that any deterioration in quality or preparation can be quickly detected and brought to the attention of the shippers for correction.

Careful attention should be given to the drafting of locomotives, maintenance of brick arches, cleaning of flues and superheater units, washing of boilers and general maintenance of boiler and machinery, as well as to the distribution of steam.

The application of fuel saving devices should be given careful consideration, and service tests made of the devices that will best suit the class of power and service in which they are used. If favorable results are obtained the application of these devices should be encouraged.

Fuel supervisors, road foremen of engines and traveling firemen should be assigned to instruct firemen while in service as to the proper method of distributing the fuel in the firebox, so that the most economical results will be obtained with the least amount of fuel. Firemen should take advantage of every operating and roadway condition that will reduce the unnecessary consumption of fuel, and try to arrive at the terminal with the fire burned down and having only sufficient fire so that the locomotive can be handled over the cinder pit and through the coaling station.



The possibility of still greater economy in the use of fuel in the future is receiving consideration in foreign countries as well as in the United States. Within the past two years a number of interesting and novel experiments and changes have been made in the design of locomotive boilers and machinery, with a view of effecting substantial

fuel economies from the locomotive as a unit.

The steam locomotive, if it is to continue, must effect economies in fuel and water that will more nearly approach the economies effected by our modern stationary power plants. Distinct progress is being made in this direction.

Cutting Down the Weight of Passenger Coaches

By W. J. Tollerton

General Mechanical Superintendent, Chicago, Rock Island & Pacific

IN DESIGNING the new 70-foot Rock Island suburban coaches, a successful step was taken to reduce the weight of passenger equipment. The complete car weighs 92,000 pounds and seats 100 passengers, or 920 pounds dead load per seated passenger. Wide aisles, longitudinal seats at the ends, and large platforms, bring the total capacity easily to 200 passengers, or a dead weight per passenger of 460 pounds when loaded to maximum capacity.

The car measures 81 feet 8½ inches over normal buffers—a few inches longer than the standard main line coaches of usual design, whose weights vary between 122,000 and 145,000 pounds. Attention is directed to the fact that the weight of the trucks is largely governed by the weight of such items as wheels, axles, boxes, and brakes, which are fixed by standard practice and so are beyond the designer's jurisdiction. The trucks under these cars weigh 26,000 pounds per pair, which is only slightly less than the weight of the usual four-wheel truck for passenger service. Therefore, it is evident that the eliminating of excess weight was only possible by carefully designing the body to perform its functions efficiently. The car body, fully equipped, weighs 66,000 pounds, and, again, by taking items such as electrical equipment and specialties beyond the car designer's control, it is evident that careful consideration of the car structure proper was necessary.

The load carrying capacity was obtained by developing the side construction into a true girder to carry the load

to the bolsters; particular attention was given to the design of window posts to resist horizontal shear, for it is obvious that the sides cannot act as unit girders unless this shear is resisted. The calculated stress in the girders under maximum load is 12,000 pounds per square inch in the compression flange and 7,000 in the tension flange. The center sill was designed as a buffing column; its function as a carrying member being limited to transferring the loads to the cross bearers. The end loads were taken to be 150,000 pounds acting through the buffer, and 50,000 pounds through the coupler. The calculated resultant of 200,000 pounds then acts 3.16 inches above the center of the coupler and causes only .16 inches eccentricity on the sills. The sills have an area of 18.44 square inches and the ratio of stress to end load is .061 which gives a calculated buffing stress, under the above assumptions, of 12,200 pounds per square inch. Besides carefully designing the main structure, bolsters and cross bearers and various details, riveted connections were carefully studied in order to limit their stresses to around 12,500 pounds per square inch. The end construction was designed with the view to protect passengers from the effects of collision, by construction and stresses comparable with the requirements of the United States Postal Department.

As regards the application of the above principle to main line cars, no doubt the end buff should be increased to that now required by the government for postal cars, because of the longer, heavier trains and higher speed.



Without doubt, however, some savings in weight can be effected by very careful design and the utilization of sections which will give the maximum strength with mini-

mum weight. Possibly, in this connection, the A. R. A. center sill section recently developed for freight cars may work out to advantage for center members.

Importance of Human Element in Mechanical Department

By a Superintendent Motive Power

THE IMPORTANCE of the human element in industrial activities, particularly on railroads, has been in the past under-estimated and its proper understanding and handling neglected. If as much attention in the future is given to studying the human element, as has been given in the past to providing efficient machinery, devices and methods, the employee will become a better satisfied and more ambitious and loyal part of the organization. It is now becoming more generally recognized that too little attention has been given to this important factor and that a closer contact between the men in the ranks and the management is necessary to obtain more efficient and loyal cooperation of the men.

The supervising forces, which are in daily contact with the workmen, represent the management and should be educated and trained in the proper handling and understanding of the human element. They should manifest a personal interest in the affairs of the men under their jurisdiction. The good-will and confidence of the workman can be secured by close personal interest being taken in the welfare of himself and family, which will result in harmony, more efficient operation and greater loyalty.

A large percentage of the skilled American workmen is opposed to the radical element that dominates some

of the organizations and it is only necessary to prove to the men that the management is endeavoring to better the conditions under which they work and to deal fairly with them, to win their support and cooperation. All this can be accomplished by the management and its supervising forces taking an active interest in the welfare of the employees and assisting them to live better and enjoy the fruits of their labor. This cannot be accomplished by paternalism, for the American workman is an independent individual. He should be well paid for the work he performs, at least equal to the rates paid by other railroads for the same class of work. His working conditions should be as comfortable as possible; grievances should be adjusted promptly before serious misunderstandings arise. A supervisor of employment, or man occupying a similar position, should be assigned the duty of assisting the man when misfortune, injury or illness overtakes him, thus proving that the management is actively interested in the welfare of himself and family. By this means it is possible to establish mutual confidence between the management and men and eliminate the distrust that has grown between the management and employees, due largely to neglecting the human element in our industrial organizations.

Program of the Mechanical Division Meeting

Important reports will be considered at the three-day convention, June 16-18

THE annual meeting of the Mechanical Division of the American Railway Association will be held at the Drake Hotel, Lake Shore Drive and North Michigan Boulevard, Chicago, on Tuesday, Wednesday and Thursday of next week (June 16, 17 and 18). The meetings will be called to order at 10:00 a. m., Chicago daylight saving time; this is one hour faster than central standard time.

The Committee on Car Construction has arranged for an exhibit of box cars built according to its designs. A number of new designs of locomotives will also be shown. The exhibit will be on tracks 4 and 5, slip A, in the South Water street yards of the Illinois Central.

Tuesday, June 16, 1925

The meeting will be called to order by the chairman promptly at 10:00 a. m., Chicago daylight saving time.

Prayer.

Address by R. H. Aishton, president, American Railway Association.

Address by chairman, J. J. Tatum, general superintendent car department, Baltimore & Ohio.

Report of General Committee.

Report of Nominating Committee.

Report of Committee on Shops and Engine Terminals.
Report on Locomotive Design and Construction.

Wednesday, June 17, 1925

Individual paper, "Fuel Conservation", by F. H. Hamill, executive vice-president, Chicago, Rock Island & Pacific.

Report of Joint Committee on Utilization of Locomotives, to be presented by T. B. Hamilton, vice-president, Northwestern Region, Pennsylvania System.

Report of Committee on Electric Rolling Stock.

Report of Committee on Car Construction.

Report of Committee on Tank Cars.

Report of Committee on Brakes and Brake Equipment.

Thursday, June 18, 1925

Report of Arbitration Committee.

Report on Prices for Labor and Materials.

Report of Committee on Couplers and Draft Gears.

Report of Committee on Loading Rules.

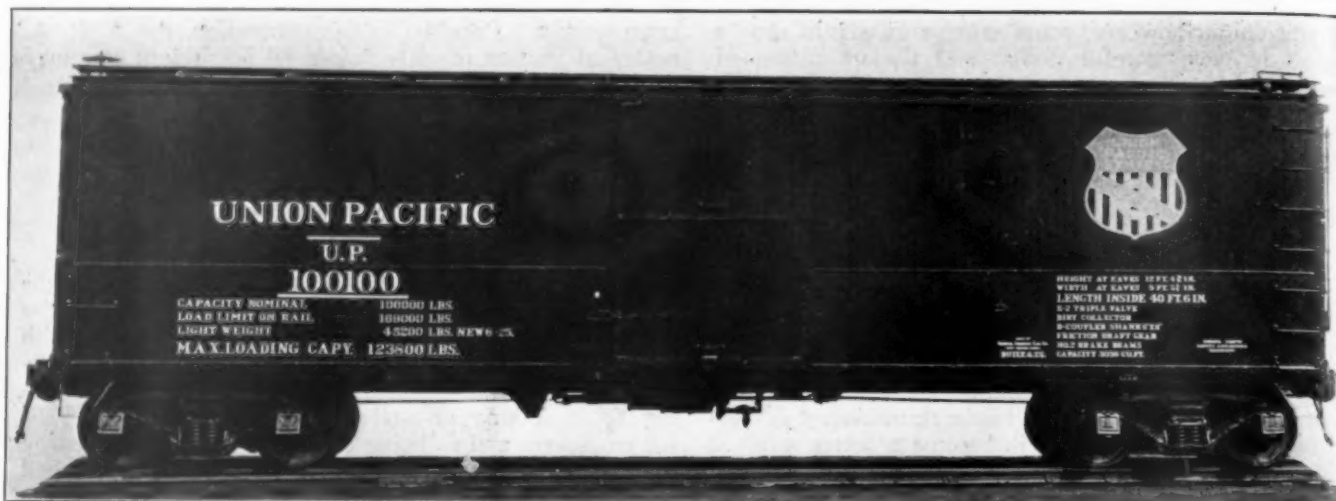
Report of Committee on Safety Appliances.

Report on Specifications and Tests for Materials.

Report of Committee on Wheels.

Election of officers.

Adjournment.



Proposed Standard 50-Ton Box Car with Wood Sheathing and Lining—Builder, General American Car Company

Box Cars Exhibited at Chicago

Many alternatives incorporated in standard designs of double and single sheathed cars

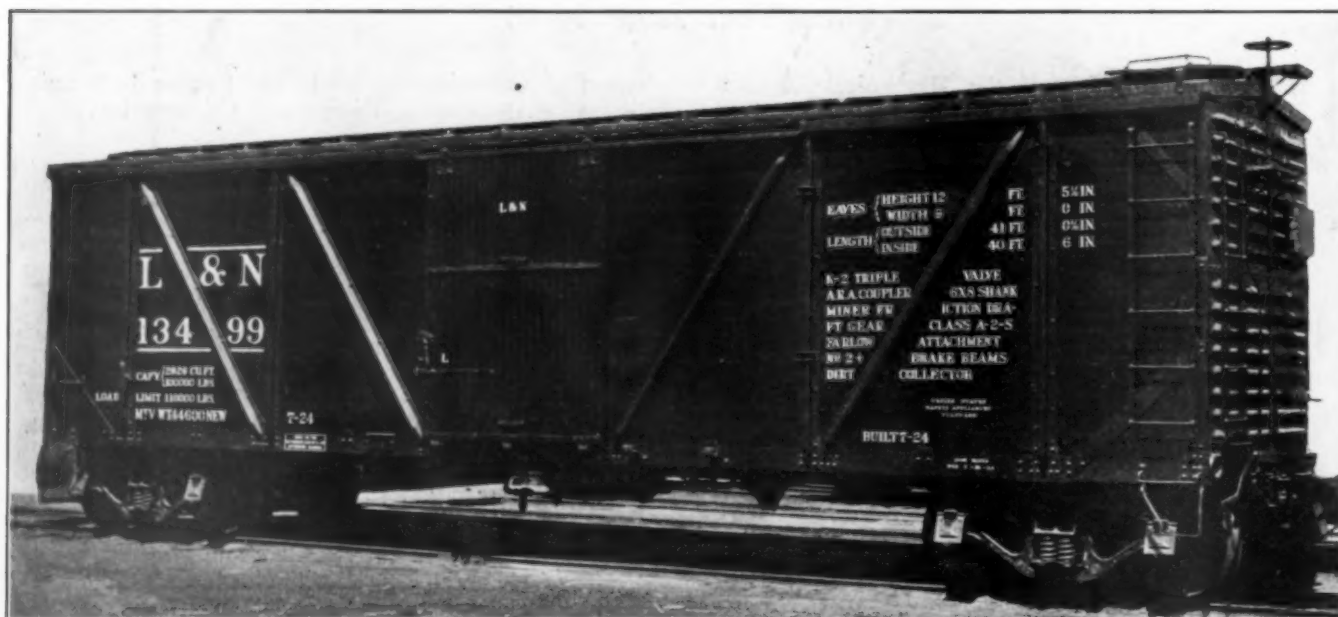
THE exhibit of the present and proposed standard box cars to be shown on tracks No. 4 and No. 5, slip A, South Water street Yard of the Illinois Central during the meeting of the Mechanical Division of the American Railroad Association will constitute a most instructive and valuable supplement to the report of the Committee on Car Construction. These cars, which include both the proposed double- and the present standard single-sheathed types, have been sent to Chicago by a number of representative railroads. They are interesting, not only because they are built in accordance with the standard designs as worked out by the committee, but deserve careful study due to the fact that they embody

many and varied alternatives which have been applied without departure from any essentials of the standard designs. In addition to the standard designs the Baltimore & Ohio is exhibiting two all steel cars with trucks of special design. While other cars may be included at the time of the meeting those which are assured are briefly described below.

A. T. & S. F. 40-ton Double-Sheathed Box Car

This is a 40-ton double-sheathed box car of the proposed standard design, class 4C-XM2. The equipment thereon includes:

Trucks: A. R. A. side frames on both trucks. The

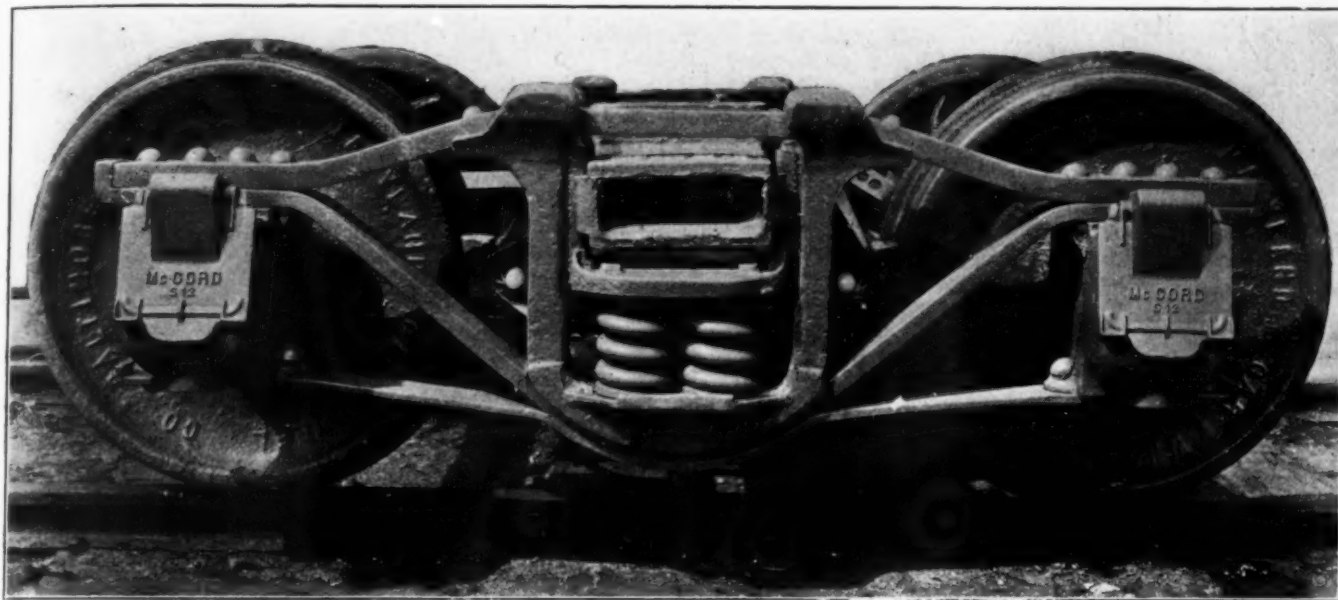


Louisville & Nashville Standard 50-Ton Single-Sheathed Box Car—Builder, Mt. Vernon Car Manufacturing Company

truck at "A" end of the car has A. R. A. design of bolster with separate center plate and standard friction side bearings. The truck at "B" end of the car has separate center plate and bolster design modified to accommodate Barber lateral motion device and Barber roller side bear-

Journal box lids: The truck at the "A" end has Asco self-fitting torsion spring lids; the "B" end of the car has Symington B-2-A malleable lids.

Ends: The "A" end of the car has built-up standard end with posts; the "B" end has a Murphy corrugated end.

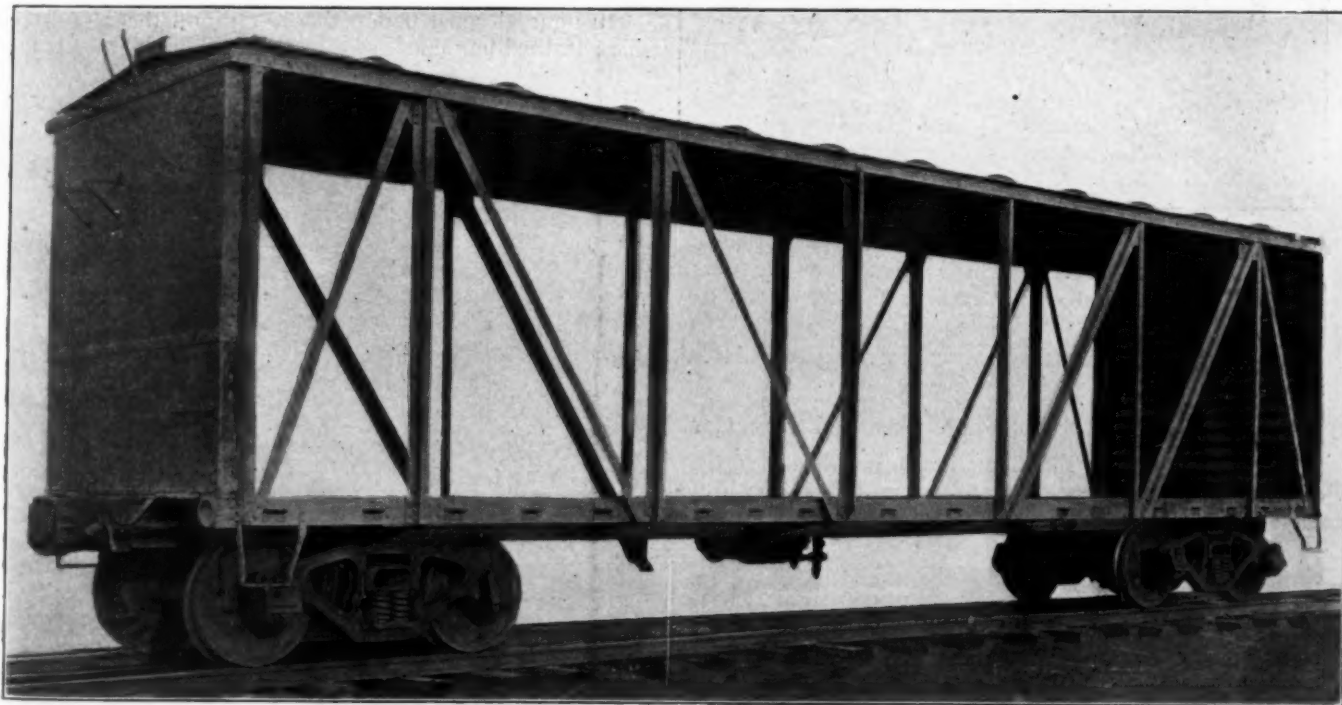


Tatum XLT Truck Used on One of the Baltimore & Ohio Box Cars

ings. A. R. A. standard springs and spring plank are used on both trucks.

Brake beams: The truck at the "A" end is equipped with Creco No. 2 beam and standard A. R. A. suspension han-

Side doors: Both doors are bottom hung. One door has A. R. A. standard sections of framing. The door posts on one side of the car are pressed, as shown on the proposed standard design; the other side of the car has



Body Framing of the Union Pacific Car, Mounted on Temporary Trucks—Built-Up Steel End at the Left

ger. The truck at the "B" end has Creco No. 2 plus brake beam, Santa Fe standard malleable hangers and Santa Fe brake beam safety suspension.

Connections and truck levers: A. R. A. standard, both trucks.

front door posts pressed, but with the front stop omitted. The front stop is a Camel section, riveted to the post. The rear door post is pressed with the outside flange omitted, and Camel weather strips are riveted to it. The rear frame of the door on this side of the car has a Camel

standard pressed angle, while the front framing includes a Z-bar providing the necessary lap in the front stop. The top and bottom framing is of Z-bar sections, as shown on the standard details.

Roof: Murphy Radial all-steel flexible roof.

Yokes: Santa Fe standard cast steel yokes made by American Steel Foundries.

Draft gear: National friction draft gear, type M/17, at the "A" end of the car, and Miner friction gear, type A-2-X, at the "B" end of the car.

Uncoupling device: Santa Fe standard, Imperial type "A" at both ends of the car.

Body side bearings: At the "A" end of the car, A. R. A. standard design. Those at the "B" end of the car are modified to accommodate Barber roller side bearings.

Air brake: Westinghouse.



"B" End of B. & O. Double-Sheathed Box Car. Equipped with Tatum XLT Trucks—The Other B. & O. Car is Equipped with Washburn Trucks

Marking: Santa Fe standard, conforming to A. R. A. specifications.

Union Pacific 50-ton Double-Sheathed Box Car

This car is 46 ft. 6 in. long inside and has a capacity of 3,038 cu. ft. The light weight is 45,200 lb., which leaves a maximum loading capacity of 123,800 lb.

The equipment on this car, which is of the 4D-XM2 class, includes:

Trucks: The "A" end has Huntoon brake beams, Schaefer brake hangers, levers and connections; Wood's roller side bearing, and Allegheny Steel Company's journal box lids. The "B" end has Creco beams and Railway Steel Spring Company's journal box lids.

Ends: The "A" end of the car has a corrugated end; the "B" end of the car is of the standard built-up type.

Uncoupling device: Carmer.

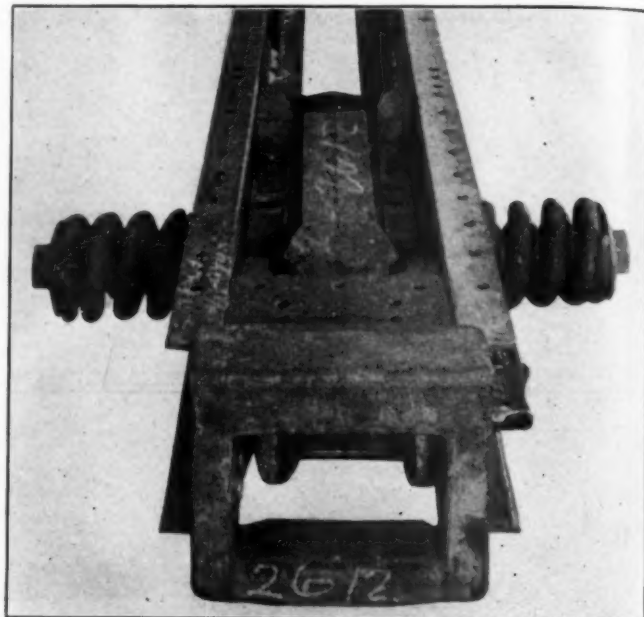
Side doors: One side has an A. R. A. standard top-hung door and fixtures. The other side has a modified Camel top-hung door and fixtures.

Roof: Murphy solid steel riveted type.

Yokes: Buckeye steel yokes at both ends.

Angle cock holders: Western Railway Equipment Company at the "A" end, and A. R. A. at the "B" end.

Draft gear: Murray on one end and Cardwell on the other end.



Combined Draft Gear Lug and End Stop Casting

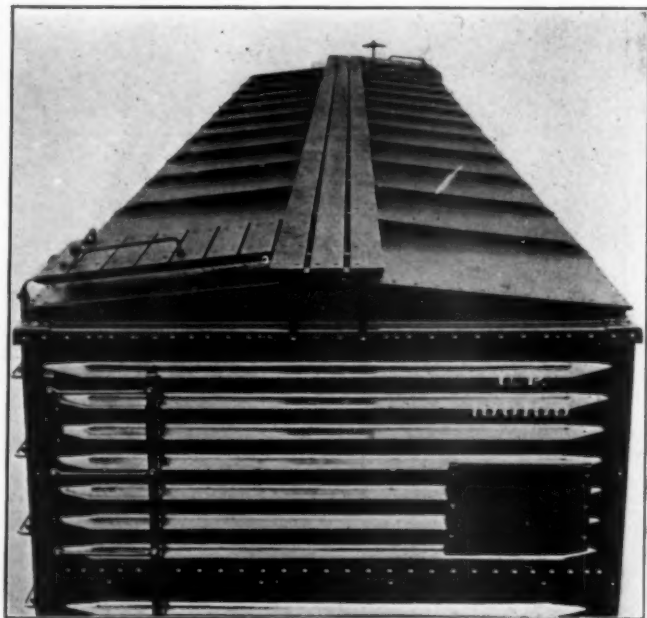
Air brake: New York.

Nuts: Grip nuts and Boss nuts.

Marking: Union Pacific standard.

Notes on 40 to 50-ton Double-Sheathed Cars

In general construction the 40-ton and the 50-ton double sheathed box cars are the same, although various parts



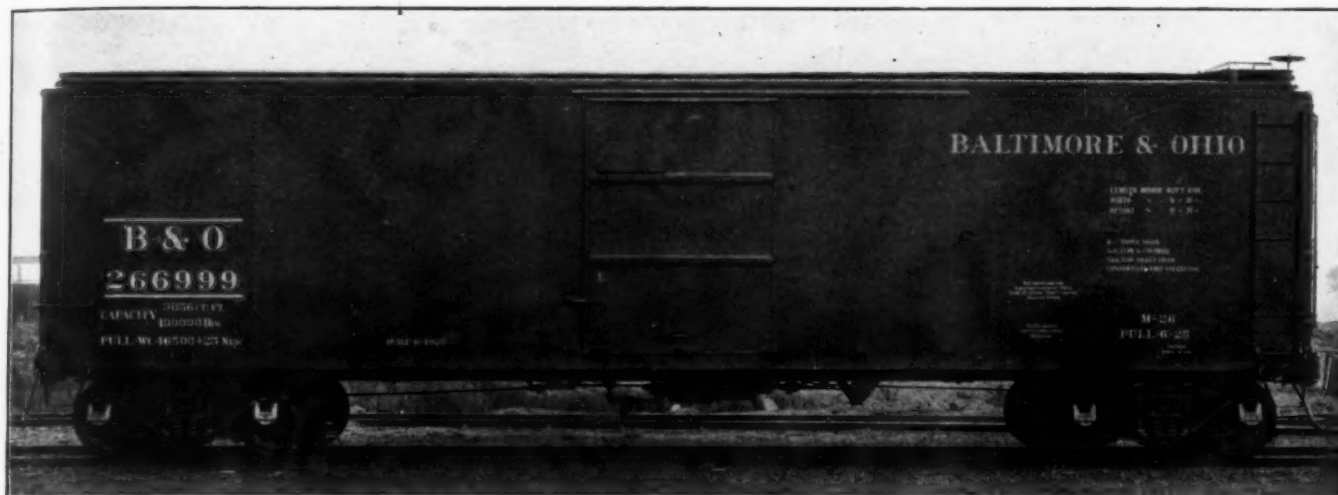
Murphy Solid Steel Roof and the Corrugated Steel End of the Union Pacific Car

are naturally of lighter construction for the 40-ton car. Some of the differences are enumerated herewith.

The underframes are of the same standard section as

that previously adopted for single-sheathed cars, the differences in the frames being so slight that if adopted for the double-sheathed car the same design can be incorporated in the single-sheathed car. The crossbearers have been moved to coincide with the location of the door posts, a change that could readily be adapted for single-sheathed cars. The body bolster top cover plates are

without bolts, nuts, washers or keys, except for brake rods and levers. The column post is locked to the top arch bar by wedges and rivets. The bottom arch bar and the tie bar are free from any sharp bends. The side frames are flexibly connected by a 6-in. pivoted channel bar. This truck design includes the Tatum-Zell waste and oil retainer, a brake beam suspension without brake hangers,



Baltimore & Ohio 50-Ton Double-Sheathed Box Car—Builder, Pullman Car & Manufacturing Corporation

$\frac{1}{2}$ -in. thick for 50-ton cars and $\frac{3}{8}$ -in. thick on 40-ton cars. The same difference occurs in the crossbearer top cover plates. These dimensions can apply also to single-sheathed cars. The side sills are punched the same for both top and bottom-hung doors. The Z-bar side plates are $\frac{1}{4}$ -in. thick for 40-ton cars and $\frac{5}{16}$ -in. thick for 50-ton cars. The transom posts are $\frac{3}{8}$ -in. thick for 40-ton cars and $\frac{1}{2}$ -in. thick for 50-ton cars. The punching for posts, braces, sills and plates are identical for cars of either capacity. The end sill angle has been shifted $1\frac{7}{16}$ -in. but the same punchings of underframe have been retained, the punching of the sill being changed to suit. The end plates are the same shape but they have been offset in order to accommodate vertical posts or built-up ends. The holes in the end sill angles have been spaced so as to take standard uncoupling device.

A particularly interesting feature of the design is the combination dead block and front draft lug. This combination is shown in one of the illustrations.

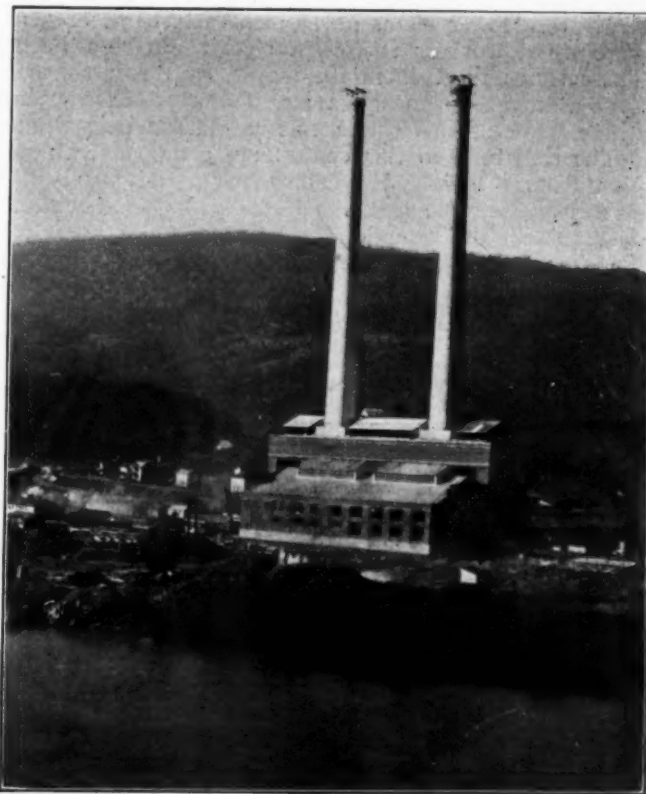
Louisville & Nashville Car

The sample car exhibited by the Louisville & Nashville is of the standard single-sheathed design, in the construction of which a number of alternates have been incorporated. It is of 50-ton nominal capacity and weighs 44,600 lb. light. It has corrugated steel ends and XLA outside flexible metal roof. The draft gear is Miner friction, class A-2-S with Farlow attachments; the coupler release attachment is the Carmer. The trucks have cast steel side frames with journal boxes cast integral. The truck bolsters are fitted with roller side bearings.

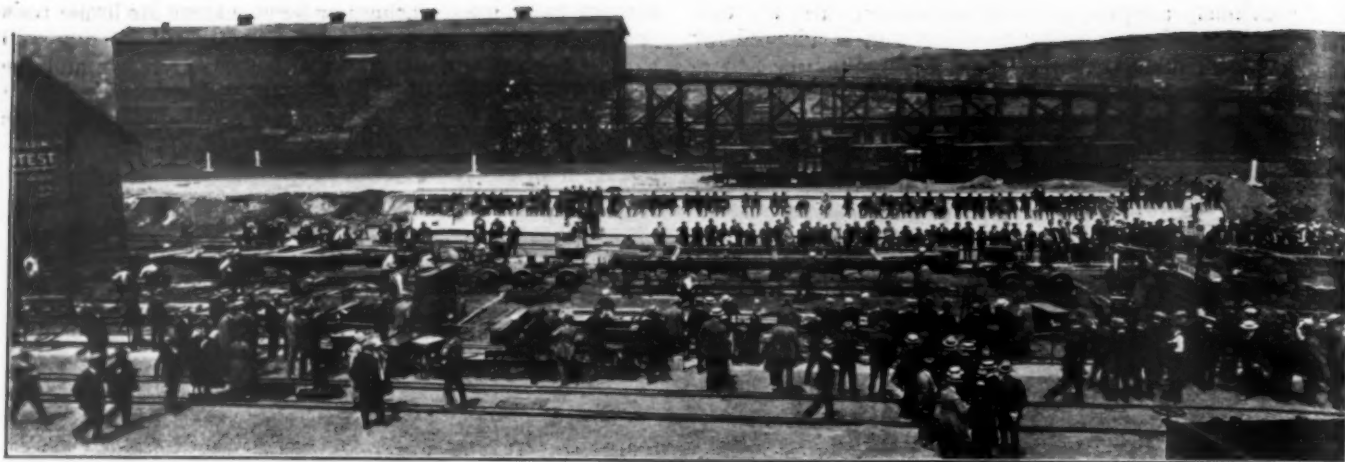
B. & O. Double-Sheathed Cars

Two 50-ton double-sheathed cars with two new types of trucks are exhibited by the Baltimore & Ohio. These are 40 ft. 6 in. long, 8 ft. $9\frac{1}{8}$ in. wide and 8 ft. $7\frac{3}{8}$ in. high—all inside measurements. The capacity is 3,056 cu. ft. The light weight is 46,900 lb., which leaves a maximum loading capacity of 122,100 lb. One car is equipped with the Tatum patented arch bar flexible truck, built

and fulcrum bar safety straps. The other car is equipped with the Washburn patented arch bar truck side frame. This truck was described in the *Railway Age*, April 12, 1924.



The Virginian's New Power House at Narrows, Va.—To Supply Current for Electrified Section



Scene During the Recent Car Building Contest Held by the Delaware & Hudson at Carbondale, Pa., May 21, 1925

Third Car Repair Contest on D. & H.

*Three teams compete for silver cup and cash prizes—
Winners rebuild gondola in 45 man-hours*

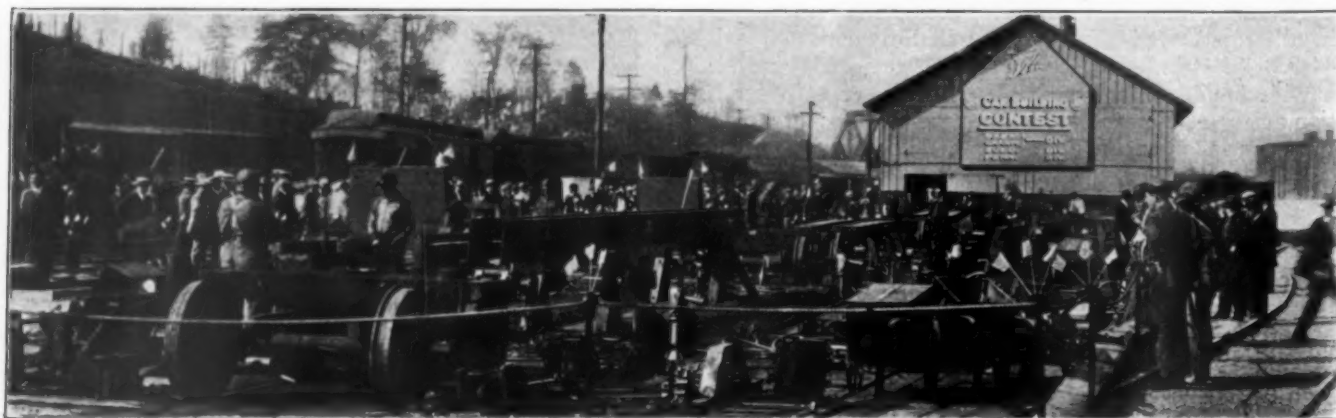
THE third of a series of car building contests conducted by the car department of the Delaware & Hudson Company was held at Carbondale, Pa., Thursday, May 21, 1925. The problem on this occasion was the rebuilding of a Delaware & Hudson standard tandem twin-hopper bottom gondola car of 85,000 lb. capacity. The work consisted of assembling the trucks and rebuilding the steel underframe and wooden superstructure. Three teams of 16 men each, eight of which were wood workers and eight steel workers, competed. These teams represented the major car repair shops on the Saratoga, Susquehanna and Pennsylvania divisions, where work of this character is a routine performance.

The cars built in this contest are equipped with steel underframes and have wood flooring and superstructure, including the side stakes. The hoppers, with the exception of the side slope sheet are also of wood construction. An idea of the size and type of the car may be obtained from the illustration showing the car rebuilt by the winning team after it had been completed and placed in service. The distance over the striking castings is 38 ft. 1 in. and the distance between truck centers

is 27 ft. 5½ in. The inside dimensions of the car body is 36 ft. by 8 ft. 6½ in., the distance from the top of the floor to the top of the side being 51¼ in. The large amount of wood construction performed upon the car was an excellent test for the wood working gang, which in the case of the Susquehanna division, which won the contest, completed its work in 25 man-hours; the steel workers completing their task in a little less than 17 man-hours.

The rebuilding of the car required the driving of 847 button-head rivets and the applying of 1,015 bolts of various sizes. The painting of the car required two gallons of red lead for the underframe, 3½ gallons of black paint for the truck and frame, three gallons of metallic freight car paint and one pound of white lead. The car is equipped with Wine hopper door appliances and side and end ladders, Miner draft side castings and Harvey draft springs. The trucks are of the archbar type having cast steel truck bolsters and Schaeffer bottom connecting rods, brake hangers and truck levers.

The contest was started at 8 a. m. and continued uninterrupted, with the exception of an allowance of ten



Just Before the Start of the Contest

minutes after the completion of the steel work in order to make the necessary preparations for the wood work, until the car was completely built.

From the standpoint of the observer, the contest was



Presentation of the Birkett Silver Cup

of exceptional interest. No two of the three teams performed the work alike, or had the material arranged in the same manner. The team representing the Penn-

sylvania division assembled the underframe and applied the side sills, then the hoppers, floor and the ends and sides. After the various planks were placed in position for bolting, the trucks were run under the car and the work of applying and tightening the bolts on the woodwork, safety appliances, brake rigging, hand holds on the super-structure, etc., was completed.

The Susquehanna division assembled the underframe and applied the side sills, hoppers and floors in the order named. While this work was being completed, the trucks were assembled and made ready to place under the car. The next job performed was the application of the draft gear and couplers and the wood workers proceeded to apply the sides and ends, steps, hand holds and uncoupling levers. Upon completion of this work, the car was raised and the trucks run under, after which the work of applying the air brake apparatus and foundation brake rigging was completed.

The team which represented the Saratoga division applied the side sills as soon as the underframe was completed, finished the hoppers, applied the draft gear and couplers, and placed the trucks under the car, the trucks being assembled while the underframe was being built. The floors, steps and hand holds were applied at practically the same time as the air brake and foundation brake rigging. As soon as the uncoupling levers had been applied, each man on the team proceeded to tighten the nuts on the bolts and finish the various miscellaneous items.

The Susquehanna division team was the first to complete the task, which required 5 hr. 20 min., making a total of $42\frac{2}{3}$ man-hours, exclusive of the air brake work, painting and stencilling. Adding this work to the total man-hours required to build the car, the entire job of rebuilding, painting and stencilling the car required a total of $45\frac{1}{3}$ man-hours. The time required for this team to perform the various major operations was as follows:



The Winners—Susquehanna Division

sylvania division assembled the underframe and then applied the draft gear and couplers. While this work was in progress, the work of rebuilding the trucks was completed. The next operation was to apply the steps, hand holds and uncoupling levers to the underframe,

| | Man-hours |
|--------------------------------|----------------|
| Trucks completed | 1 hr. |
| Steel work | 16 hr. 40 min. |
| Wood work | 25 hr. |
| Air brakes | 1 hr. 10 min. |
| Painting and stencilling | 1 hr. 30 min. |
| Total | 45 hr. 20 min. |

At 4 p. m., approximately one hour after the Susquehanna division had completed its work, the first car was spotted and loaded at the coal breakers at Carbondale and left that point 55 min. later, destined to Wakefield, Mass., via the Boston & Maine.

The judges were P. Alquist, master car builder, Delaware, Lackawanna & Western; W. G. Knight, mechanical superintendent, Bangor & Aroostook, and C. P. Pfeiffer, master car builder, Buffalo, Rochester & Pittsburgh. This committee inspected each car upon the completion of each major operation and also made a



Car Built by the Winning Team Ready for Service

final inspection after the work was completed. It reported that in its opinion, the work of each team was of an equally high standard so that the status of each was fixed by the time required to complete the work. The prizes were awarded by Colonel J. T. Loree, vice-president and general manager, Delaware & Hudson, who was an interested spectator throughout the contest and complimented the winners on their excellent performance.

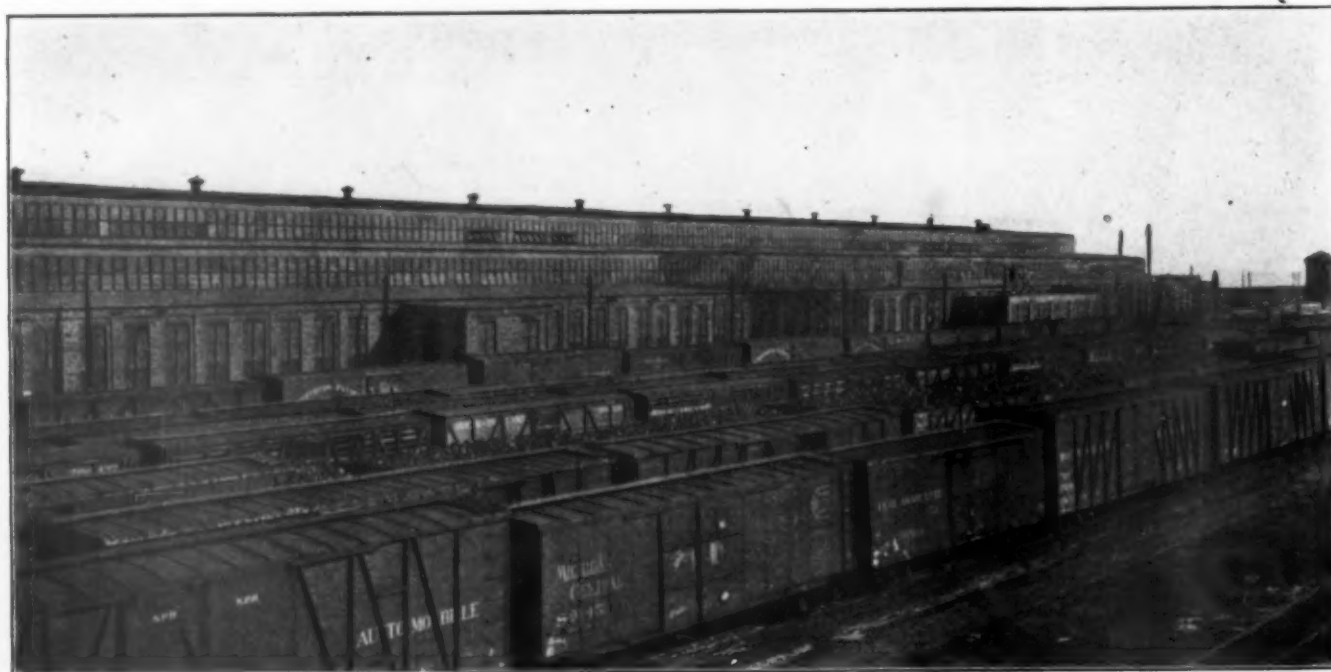
Approximately 500 persons witnessed the contest and the awarding of the Birkett silver cup to the Susque-

hanna division team for the second consecutive time. This cup is dedicated to the memory of the first foreman of the car department of the Delaware & Hudson. In addition to the cup award, each man on the winning team received a cash prize and a further cash prize was awarded to the Saratoga division team, which took second place.

Representatives of 23 railroads and 40 railway supply companies, as well as two inspectors from the Interstate Commerce Commission, were registered in attendance at the contest. A box lunch, prepared by the wives of the supervisors of the car department of the Pennsylvania division was served in the wood mill during the noon-hour to the guests of the Delaware & Hudson.

These contests, of which this was the third, are entered into with a friendly spirit of rivalry and are not only interesting, but also instructive to the employees. One of the outstanding features is the material layout, which indicates in many respects efficient and economic car shop operation. The compensation of the employees in the car department is fixed on a piece-work basis and these contests afford an ideal opportunity to study that phase of car repair work. The ready accessibility of material stimulates production and the resultant increased output is reflected in the earnings of the piece-worker.

The first of these contests, which was described in the December 22, 1923 issue of the *Railway Age*, was held at the Colonie shops on October 31, 1923. Five teams of six men each, selected from the major shops of the Delaware & Hudson participated, the winner of that contest being the Carbondale team which completed the task in 7 hr. 49 min. The second contest was held at the Oneonta shops of the Susquehanna division on May 8, 1924, at which time the super-structure of a 60,000-lb. capacity steel-frame box car was rebuilt and the trucks and draft gears assembled. Three teams of eight men each competed. The winner was the Susquehanna division team which performed the work in 6 hr. 30 min., or 52 man-hours.



Silvis Shops, Chicago, Rock Island & Pacific

John M. Davis President of D. L. & W.

*Head of Manning, Maxwell & Moore chosen to succeed
W. H. Truesdale, who becomes chairman*

WILLIAM H. TRUESDALE has resigned as president of the Delaware, Lackawanna & Western, and will become chairman of the board of managers of the company; John M. Davis, now president of Manning, Maxwell & Moore, Inc., has been chosen to succeed Mr. Truesdale as president.

When Mr. Truesdale came to the Lackawanna, in 1899, it was primarily a coal road. Of its total operating revenues in 1900—Mr. Truesdale's first full year with the company—approximately 40 per cent were derived from the transportation of coal, 30 per cent from other

considerable fame as a railroad which did not operate trains on Sunday. With the constant improvement in the physical plant, however, the road soon became famous as the line of Phoebe Snow, and one which could advertise itself—with a great deal of truth—as "mile for mile the most highly developed road in America."

There has been scarcely a year in Mr. Truesdale's incumbency as president when some major scheme for improvement has not been actively mooted or actually under way. In 1900 the company's balance sheet showed a cost of road and equipment of about \$25,000,000. In



John M. Davis



W. H. Truesdale

freight and 20 per cent from passengers. How completely the character of the Lackawanna's traffic changed under Mr. Truesdale's administration is shown by comparing these percentages with those for the year 1924, when the transportation of coal brought only about 27 per cent of the total operating revenues, other freight 45 per cent, and passenger traffic 15 per cent. Yet, measured in actual tons, the coal handled by the Lackawanna in 1924 was almost exactly twice as great as the tonnage handled in 1900. In other words, under Mr. Truesdale's direction the road became of first importance as a merchandise carrier and increased its passenger business, not by neglecting its coal traffic, but by making constant and heavy expenditures in the provision of facilities which would make possible the service which would enable it to compete successfully for other classes of traffic.

Under the administration previous to that of Mr. Truesdale there was a time when the Lackawanna had a

1924 this figure had risen to almost \$96,000,000. In 1900 the equipment amounted to about half of the investment in road. In 1924, the two were approximately equal. In short, in 1899 when the directors were seeking a new president they realized the one-sided nature of the road's traffic, and, consequently, sought not an expert in the handling of coal traffic, but rather a man with versatile experience in railroading who could expand the property into an all-round carrier, which is what Mr. Truesdale proceeded to do.

The road was one of the first to equip all of its main line mileage with automatic block signals. Vast sums were spent on improving the line and grade. The 38-mile cut-off between Clarks Summit, Pa., and Hallstead, alone cost about \$12,000,000, and the 28-mile cut-off from Port Morris, N. J., to Slateford Junction, Pa., only slightly less. The former of these projects includes the famous Tunkhannock viaduct, and the latter has a fill which is

one of the largest in the world. The road has consistently year after year added to its mileage of third and fourth main tracks, thereby, with the extensive use of the automatic block signals, permitting the uninterrupted movement of passengers and high grade merchandise.

It has not contented itself, however, with directly utilitarian improvements. The effect of appearances on the public and the morale of employees has been constantly kept in mind. Virtually all of its important stations and other buildings are of the most modern and pleasing type. Its track is maintained to a high standard, and that of all of the road's physical property, including equipment, is kept in an excellent state of cleanliness and order. The company has carried on grade crossing elimination aggressively for many years, and on several sections of its line this work is approaching 100 per cent completeness. The policy of the company in all these improvements has been thoroughly vindicated from a financial point of view. In the period since Mr. Truesdale assumed the presidency the property has averaged 14¾ per cent in cash dividends and 5 per cent in stock dividends on its stock.

Mr. Davis comes to the Lackawanna at a time when its development shows no signs of letting up. Grade crossings are still being eliminated, multiple tracking is going forward and terminal improvements at the Eastern end of the line are under way. The matter of electrification of considerable portions of the line, which was indefinitely postponed a couple of years ago; will likely arise again before a great while. And there remains, for Mr. Davis's action the vast and complicated matter of the Lackawanna's status in various proposed consolidations.

W. H. Truesdale

Mr. Truesdale was born on December 1, 1851, near Youngstown, Ohio, and was educated in the common schools at Rock Island, Ill. In 1869 he entered the service of the Rock Island & St. Louis (now a part of the Chicago, Burlington & Quincy) as a clerk in the auditing department. Later he served as cashier, and still later as purchasing agent for the same road. In 1872 and 1873 he was in Frankfort, Germany, as transfer agent for the company, and in the following year returned again to Rock Island as purchasing agent. In 1875 he became connected with the firm of Osborn & Curtis, railroad attorneys, at Rock Island. In 1876 he was appointed assistant to the receiver and treasurer of the Logansport, Crawfordsville & Southwestern (now a part of the Pennsylvania) at Terre Haute, Ind. Three years later he became general freight agent for the same road, and in 1881 was appointed assistant traffic manager of the Chicago, St. Paul, Minneapolis & Omaha. He became assistant to the president of the Minneapolis & St. Louis in January, 1883, and in May of the same year was elected a vice-president.

In 1887 Mr. Truesdale was advanced to the presidency of the Minneapolis & St. Louis, and the following year was appointed receiver. In 1894 he went to the Chicago, Rock Island & Pacific as third vice-president and general manager. In 1887 he became second vice-president and general manager, and, in 1898, first vice-president and general manager. On March 1, 1899, he was elected president of the Delaware, Lackawanna & Western, with headquarters at New York, and has served continuously in that capacity until his recent election to the chairmanship of the board of directors—or managers, as they are called on the Lackawanna. He is also a director of several railroad, coal and other corporations.

John M. Davis

Mr. Davis brings to his new position a railroad experience quite as diverse as that of Mr. Truesdale. He was born at Palestine, Tex., and entered railroad service in

1888 as a freight brakeman on the San Antonio & Aransas Pass. In 1891 he entered the office of the superintendent of the Gulf, Colorado & Santa Fe at Temple, Tex., as a stenographer, and three years later he went to Tampico, Mex., to become chief clerk to the superintendent of the Mexican Central; the following year he returned to the United States and assumed a clerkship in the general manager's office of the Great Northern at Duluth, Minn. In 1896 he went to Buffalo, N. Y., as chief clerk to the superintendent of the Northern Steamship Company, and in 1897 he became chief clerk to the assistant general superintendent of the Great Northern at St. Paul, Minn. In 1898 he was appointed assistant superintendent at Melrose, Minn. He later served as superintendent of the Breckenridge and Montana divisions of the same road, and in 1900 was appointed superintendent of the Erie at Scranton Pa. He remained at this post for two years, and the experience he gained in it will, incidentally, doubtless stand him in good stead in his connection with the Lackawanna, since its operation centers so largely on Scranton.

In 1902 Mr. Davis became superintendent of the Erie's Union Steamboat Line at Buffalo, N. Y., and shortly thereafter was appointed superintendent of the Allegheny division. In 1903 he returned to the Great Northern as superintendent at Superior, Wis., and in 1905 was appointed assistant general superintendent of the Central district of this road at Minot, N. D., having served as superintendent of two other divisions on the road just prior to this promotion. In the following year he went to Salt Lake City as general superintendent for the Oregon Short Line, the Union Pacific and the Southern Pacific. In 1907 he became acting general superintendent, and, in 1908, general superintendent of the Oregon Short Line and Southern Pacific in Nevada. In 1910 he was transferred as general superintendent of the Southern Pacific at San Francisco, Cal.

Four years later Mr. Davis went to Cincinnati, Ohio, as general manager of the Baltimore & Ohio, and the Cincinnati, Hamilton & Dayton, and two years later was elected vice-president in charge of maintenance and operation of the Baltimore & Ohio, with headquarters at Baltimore. In 1918 and 1919 he was manager of the Baltimore & Ohio's New York terminals and the Staten Island Rapid Transit under the United States Railroad Administration. From the latter part of 1919 to March, 1921, he performed special work in connection with the consolidation of coal and other properties, and then became the advisory chairman to the board of directors of Manning, Maxwell & Moore, Inc. On April 26, 1921, he was elected president of that company, and has served as such up to the present time.

Mr. Davis served as a member of the Railroad Administration's general managers' committee at New York, in connection with the consolidation of terminals and floating equipment during the war. During the coal shortage in the winter of 1922-23 he was a member of the advisory committee for the New York City district of the State Fuel Administration. He is a member of a board of directors and executive committee of the Coal & Iron National Bank, New York; a member of the board of directors of the Pennsylvania Coal Company, and vice-president and a member of the executive committee of the Railway Business Association.

THE NEW ENGLAND Shippers' Regional Advisory Board was organized at Boston on June 5, and committees named to deal with the freight problems of all the principle business interests, about 60 committees altogether. William F. Garcelon, of Boston, was elected general chairman.

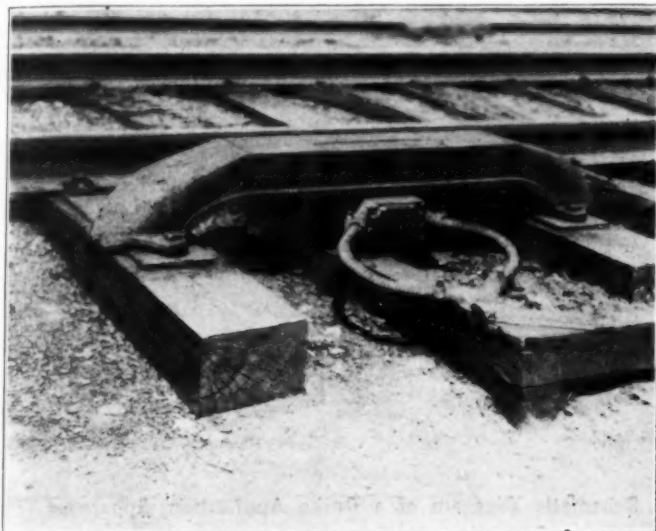
Southern Installs Train Control

Intermittent inductive auto-manual type with permissive feature under construction on 639 miles

By W. J. Eck

Superintendent of Signal and Electrical Department, Southern, Washington, D. C.

THE Interstate Commerce Commission, in its order No. 13413, dated June 13, 1922, directed the installation of automatic train control on one passenger locomotive division on the Southern Railway and also on the Cincinnati, New Orleans & Texas Pacific, both of these roads being component parts of the Southern Railway System. On January 14, 1924, a second order



Inductor in Place Alongside Track

was issued extending the scope of the first order so that at present two divisions on each road, or a total of four divisions of the system, must be equipped. The territory selected by the management for the installation is as follows: Southern Railway: Spencer, N. C., to Atlanta, Ga., 306.4 miles of road, all double track, with 101 locomotives. C. N. O. & T. P.: Ludlow, Ky., to Chattanooga, Tenn., 332.7 miles of road. Of this 166.4 miles is double track and 166.3 miles single track, with 178 locomotives. The total for the system includes 639.1 miles of road, 1,112.2 miles of track and 279 locomotives.

Preliminary Installation for Development Purposes

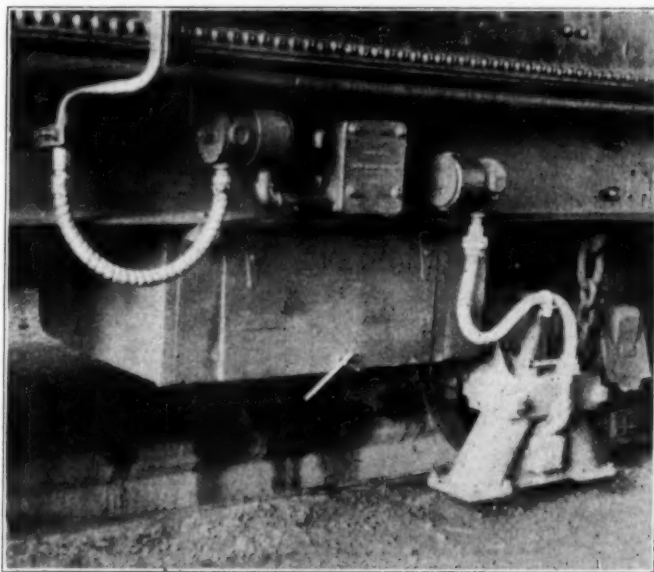
Upon receipt of the order of June 13, 1922, steps were immediately taken to equip 10 locomotives and 35.5 miles of double track on the C. N. O. & T. P. between Ludlow, Ky., and Williamstown. All of the field work, on this preliminary test installation of the General Railway Signal Company's inductive tapered speed control had been completed and considerable work finished upon the locomotive equipment when the commission modified the functions required of an automatic train stop contained in the original order. This modification was issued on July 18, 1924, and consisted in the restoration of a clause which provided for the so-called "permissive feature." This change was of the utmost importance to the railroads installing train control, particularly to those operating with

traffic of light or medium density, for it permits the use of an automatic stop which can be installed at much less cost than any system of speed control known.

A plain automatic stop with the permissive feature, now permitted by the commission will, for example, stop the train when the engineman misreads or fails to see a restrictive signal governing his train due to fog, smoke or inattention, or when he fails to heed a stop or caution signal due to incapacity, illness or death; in short, whenever the engineman does not properly read and understand the indication of the signals and when he, in addition, fails to perform some definite act to show that he has observed the signal indication, this act of the engineman being called "Acknowledging." After acknowledging and thus demonstrating that he is aware of the necessary action to be taken by him, he is free to govern the train in the manner which his experience and judgment have shown is necessary.

Decision to Change to Auto Manual Train Stop

The management of the Southern Railway System recognized at once the manifest advantages of such a sys-



Release Contactor Mounted Between Plug Couplings on Tender Frame—Receiver Hung from Truck Frame

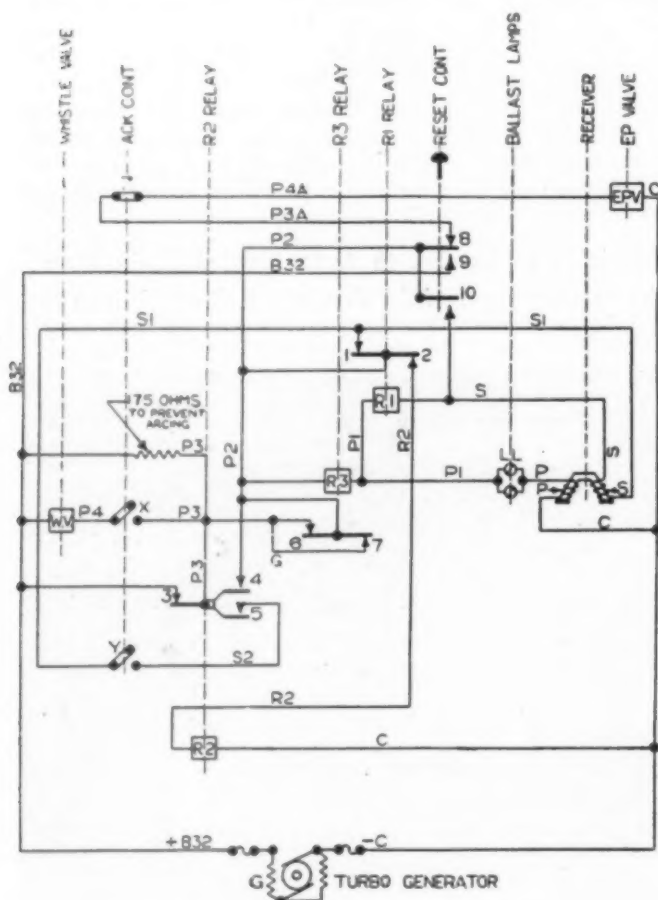
tem over that formerly required by the commission. Work was stopped on the speed control device being installed and arrangements made with the General Railway Signal Company for a preliminary installation of its auto-manual type of automatic stop in the same territory; viz., Ludlow, Ky., to Williamstown, and upon eight locomotives, two local freight, two through freight, two local passenger and two through passenger. This device is an automatic type of the intermittent inductive type with the permissive feature. It would, it was believed, meet sat-

isfactorily the requirements of the commission; it is relatively simple and rugged, can be quickly installed and readily maintained; requires a minimum of changes in the existing signal system, and possesses all the advantages of any automatic stop with permissive features enumerated in the preceding paragraphs. Work was prosecuted as vigorously as possible and by December 1, 1924, the equipment on the eight locomotives and all of the track work was completed and placed in regular service.

The preliminary interim inspection was made during the first week of March, 1925, by four engineers of the commission, detailed examination and tests being made of both the roadside and locomotive equipment in regular service. As a result of this examination, the commission made a report to the railway which was published in the *Railway Age*, of April 4, 1925, page 884. The results that had been obtained in the daily operation of the device and the favorable nature of the commission's report convinced the management of the Southern that it would be justified in going ahead with the installation of the auto-manual control upon the entire territory to be equipped

the caution or stop indications of wayside signals. The penalty for failure to acknowledge either of these signal indications is an automatic brake application from which the brakes cannot be released until the train stops.

The control device between the wayside and the locomotive is composed of two parts, a "receiver" and an "inductor." The receiver is carried by the locomotive and is fastened securely to the trucks of the locomotive tender. It consists of an inverted U-shaped magnet with

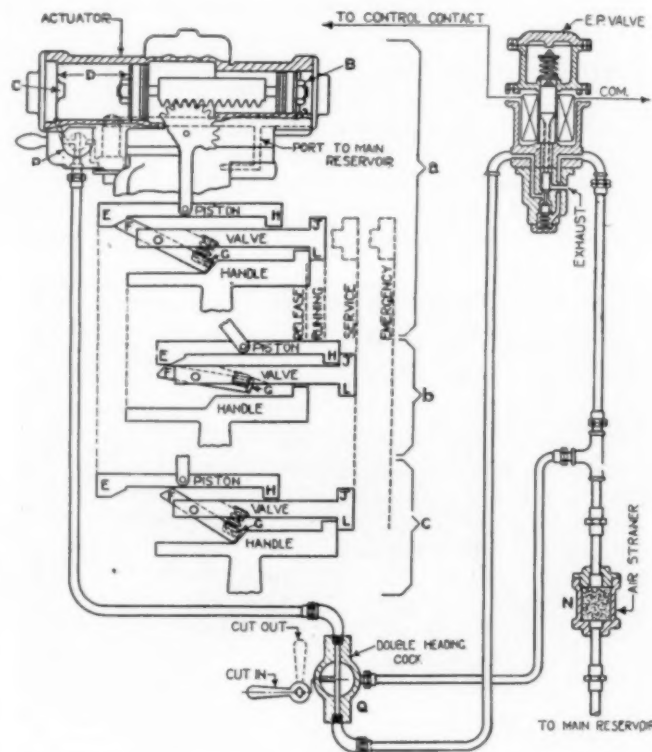


Typical Locomotive Train Control Circuits

under the orders of the commission. Accordingly, material has been ordered, contracts signed with the General Railway Signal Company for engine equipment and roadway inductors, and field forces are at work, it being the railway's intention to complete the work on the four divisions as promptly as possible.

Description of the Devices and System

The object of this auto-manual system is to enforce the observance of the speed restricting indications of wayside signals by compelling the engineman to perform some manual act called "acknowledging" when passing either



Schematic Diagram of a Brake Application Apparatus

laminated cores, large pole pieces and two coils. The inductor, the wayside element, consists of a U-shaped magnet with laminated cores and pole pieces the same shape, size and spacing as the pole pieces of the receiver. It is located on long ties and special tie plates with its pole faces $2\frac{1}{2}$ in. above the top of the running rail and its center line parallel with and $20\frac{1}{2}$ in. outside the gage line. The receiver is adjusted so that as the locomotive moves along the track the pole faces of the receiver pass about 2 in. above and directly over the inductor pole faces.

One of the two coils of the receiver is called the "primary" coil and, being constantly energized by current from the electric headlight generator, produces a strong magnetic field. The other coil, called the "secondary" coil, is connected to the same source of energy and in series with the coil and front contact of relay R-1.

All of the inductors (wayside elements) used in this installation are wound inductors; that is, they are provided with a choke coil which is automatically controlled through the signal system in such a way that when a speed restricting impulse is to be given the coil is on open circuit and when no impulse is to be given the coil is closed on itself.

When a train approaches a signal indicating "stop" or "caution" the receiver carried by a locomotive approaches an inductor on open circuit, a surge of magnetic flux builds up in the secondary coil and produces a negative current in the relay. This negative current is sufficient to allow the relay to open; and once open, it stays

open until restored, due to its being a "stick" relay. The opening of this relay, through certain controls, de-energizes the electro-pneumatic valve, which in turn controls the actuator which moves the engineman's brake valve to the full service position. A valuable characteristic of a purely inductive device is that the certainty and magnitude of the transmitted electrical impulse increases with speed. As the result of a receiver passing an inductor on closed circuit which would be the case under proceed signal con-



Locomotive Relays Are Mounted in a Case Located on Top of the Tender

ditions, the amplitude of the current is never enough to cause the relay to open.

Operation of the Brake Application Apparatus

The brake applying apparatus, shown diagrammatically, consists of an electro-pneumatic valve and a pneumatic device called a "brake valve actuator" for operating the engineman's brake valve to the service position. While the actuator can be used with or without a means for limiting the service application to a pre-determined brake pipe pressure reduction, the limiting feature is not used.

Referring to the diagram the part marked "piston" is attached to and operated by the piston of the actuating cylinder. The part marked "valve" is connected to the "rotary" of the brake valve. The part marked "handle" is connected to and moves with the brake valve handle.

Under all conditions, air direct from the main reservoir is supplied to the cylinder *B* which is the smaller of the two cylinders of the actuator. When the E. P. valve (electro-pneumatic) is energized, air is supplied from the same source through the air strainer *N*, the E. P. valve, the double heading cock *Q*, and the cut-out cock *P* to cylinder *D*, the larger of the two cylinders of the actuator. The piston is, therefore, shifted to the extreme left hand position as indicated in that part of the diagram shown within the bracket *a*. Under these conditions the actuator is entirely disconnected from the brake valve handle so that the engineman has the same control of the brake valve that he would have if the actuator were not installed.

When the E. P. valve is de-energized, air is exhausted

from the cylinder *D* which allows the air in the cylinder *B* to move the actuator piston to the left until it comes against stop *C*. During the first part of this movement, the cam surface *E* on the piston, being moved to the right, comes in contact with the latch *F-G* which is attached to the valve, lifting the portion *G* out of engagement with the handle. During the rest of the movement, the lug *H* on the piston is in contact with the projection *J* on the valve so that the valve is moved to the right to the service position as indicated in that part of the diagram included within the bracket *b*. In this position, it will be noted that the handle is disconnected from the valve in such a manner that the valve cannot be moved by the handle towards the left or release position. The valve can, however, be moved to the right or emergency position. The engineman can, therefore, make an emergency application at any time, but he cannot again move the brake valve until the E. P. valve is re-energized by a reset. This cannot be made until the train has been brought to a stop, as will be explained later.

In order to regain control of the brake valve after it has been moved to the service position by the actuator as explained above, the E. P. valve must first be re-energized by the operation of a reset contactor. This allows air to flow again into cylinder *D* of the actuator which moves the piston back to its original position as shown



Actuator Applied to Engineer's Brake Valve

in that part of the diagram included within the bracket *c*. The engineer then places the brake valve handle in the service position which permits latch *F-G* of the valve to engage the handle after which he has regained control of the valve and may release. It is therefore noted that the service application made by the actuator is entirely automatic, whereas the release is a manual operation.

The double heading cock *Q* consists of two separate cocks operated by the same handle which, in addition to its regular function, by-passes air around the E. P. valve when operated to the cut-out position. The cut-out cock

P is included as a part of the actuator and is normally sealed in the cut-in position. In case it becomes necessary to cut out train control for any reason, this cock may be operated by breaking a seal and turning the handle to the cut-out position. This simply admits air from the main reservoir into cylinder *D* and closes the air connection to the E. P. valve. A small indicator is provided on the actuator so that the engineman may know, at a glance, the position of the brake valve.

Explanation of Control Circuits

An inductor is placed in the rear of every signal and the wayside circuits controlling it are very simple. It is only necessary to arrange so that when the signal displays a restrictive indication, the coils of the inductor are open and when the signal is in the proceed position the coils of the inductor are closed. The modifications to existing signal circuits of any description are made easily.

Typical circuits used on the locomotive are shown in the circuit diagrams and the following is an explanation of the nomenclature and the contacts and magnets employed:

S—Secondary coils of the receiver.

P—Primary coils of the receiver.

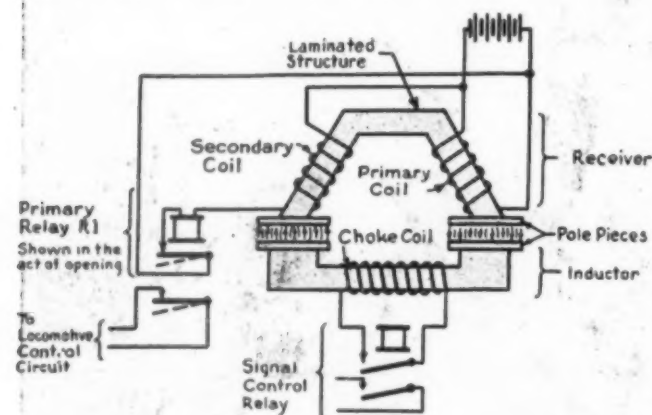
G—Turbo-generator, the one used on the locomotive for lighting purposes.

EPV—Electro-pneumatic valve controlling air to the brake applying actuator.

R1—Primary relay operated by the locomotive receiver.

R2—Secondary relay controlled by relay *R1*.

R3—Relay controlling the electro-pneumatic valve.



Circuit Showing Principles of Electro-Magnetic Control Between Wayside Inductor and Locomotive Receiver

WV—Electro-pneumatic valve controlling air to an audible signal.

LL—Ballast lamps used for correcting the fluctuation of the voltage of the turbo-generator.

Ack—Acknowledging contactor.

Cont—When the operating handle is moved from its normal position contacts *X* and *Y* are closed and a clock-work mechanism is started so that if the handle is held down for a longer period than 15 sec. contact *Z* will open.

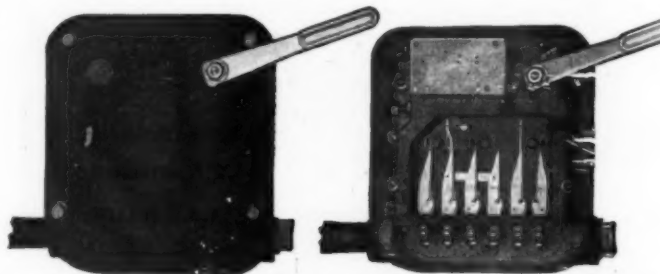
Reset Cont—Reset contactor. Contacts 8, 9 and 10 are operated by the reset contactor which is located one on each side of tender midway so that it can be operated only when the engine is at rest.

The locomotive circuits are for automatic train control protection for forward running only. The connections and position of parts as they would be when the train is running subject to automatic control between impulse receiving points are shown in the circuit diagram.

Operation of Locomotive Circuits

When the receiver passes an inductor whose coils are closed through the contact points of the track relay and the circuit controller at a proceed signal, the current through the relay *R1* is not materially changed, but when

the receiver passes over an inductor whose coils are open, the current through relay *R1* is decreased, so that its contacts are opened. The opening of contact 2 of relay *R1* deprives relay *R2* of current and the opening of contact 3 of relay *R2* deprives relay *R3* of current. The opening of contacts 6 and 7 of relay *R3* deprives the electro-pneumatic valve of current and, as previously described, a full service brake application results. The E. P. valve cannot then be supplied with current until relay *R3* is again energized. Relays *R3*, *R1* and *R2* are re-energized by the operation of the reset contactor. When contact 9 of either of the reset contactors is closed,



Two Views of Acknowledging Contactor Which Is Mounted in the Cab Beneath the Window

relay *R3* will receive current. This produces a drop in voltage across the coils of the relay *R3* so that relay *R1* will be energized. Having thus closed contact 2 of relay *R1*, relay *R2* will be energized so that contact 3 will be closed and the reset contactor can be returned to its normal position, thereby closing contact 8 which re-energizes the electro-pneumatic valve.

If, at the time the receiver passes over an inductor whose coils are open, contact *X* on the acknowledging contactor is closed, relay *R3* will not be opened, consequently the electro-pneumatic valve will not be deprived of current. With contact *X* of the acknowledging contactor closed and contact 3 of relay *R2* open, energy passes through the audible signal *WV*, causing a blast of the whistle. The blast, however, is of short duration because contact 3 of relay *R2* is opened only momentarily and when closed short-circuits the coils of the whistle valve *WV*.

When the receiver passes over an inductor under these conditions, i. e., with contact *X* of the acknowledging contactor closed, the impulse received will cause relay *R1* to open but since relay *R3* is energized, as explained, relay *R1* will immediately pick up. The momentary opening of relay *R1* opens relay *R2* which immediately picks up again. Immediately after the relay *R2* is opened, with the acknowledging contactor operated so that contact *Y* is closed, relay *R1* will be energized by the drop in voltage across the coils of relay *R3*. Energizing relay *R1* closes contact 2 of this relay which again energizes relay *R2* so that all the circuits are restored to normal. It will be noted that if the contacts *X* and *Y* of the acknowledging contactor are closed for more than 15 sec. contact *Z* will open. This will deprive the E. P. valve of current and cause an automatic brake application. If the acknowledging contactor is not operated at the time an inductor is passed whose coils are open, circuits cannot be restored to normal until contacts 9 and 10 of the reset contactor are operated.

The housing for the relays and ballast lamps as mounted on top of the tender tank is shown in one of the pictures. The relays and lamps, together with their terminals, are mounted in an inner case which is floated on heavy springs and equipped with snubbers.

The Career of Julius Kruttschnitt

Leaves Southern Pacific service after having brought several of its serious problems to solution

JULIUS KRUTTSCHNITT retired on June 1, from the position of chairman of the executive committee of the Southern Pacific Company, which he had held since 1913. He leaves the service of the Southern Pacific after 48 years' continuous service with the company, about 30 of which he has been operating head of the property and the last 13 of which he has been head of all departments. During a period as long as this, much railroad history has been made. That is less important, however, than is the fact that Mr. Kruttschnitt worked closely for many years with the man—E. H. Harriman—who had so much to do with the making of that history, and on the death of that remarkable man proceeded to become one of the leaders in the making of railroad history himself. It would be a commonplace to say that the changing problems of railroad transportation in the past several decades have required changing qualifications on the part of those guiding the destinies of the industry. It is in this respect that Mr. Kruttschnitt has particularly excelled, because he has succeeded in retaining his leadership as one different kind of problem has succeeded another. If there is one tribute owing to Mr. Kruttschnitt above all others, it is that the problems of the industry have never succeeded in getting ahead of him and this statement holds true now as much as it ever did.

Mr. Kruttschnitt was born at New Orleans, his father having been German consul at that port. He prepared for college in his native city and graduated with the degree of civil engineer from Washington and Lee University in 1873. The railway situation then being unpropitious as a result of the panic of that year, he took up teaching at the MacDonogh School for boys at Baltimore, and was assistant to the principal, Colonel William Allen, his former teacher of engineering. In 1878 he entered railway service as resident engineer in charge of the construction of a 64-mile extension of Morgan's Louisiana & Texas. On the completion of the work in 1880 he was retained as roadmaster of the western division, shortly thereafter being promoted to assistant chief engineer and then chief engineer and superintendent.

The Southern Pacific leased the road in 1885. A. C. Hutchinson, his superior, was made general manager of the Southern Pacific's Atlantic System (lines east of El Paso) and Mr. Kruttschnitt was appointed assistant general manager. He was advanced to the position of general

manager in 1889 on Mr. Hutchinson's retirement. Thus, he became a general officer at the age of 35 and after only 11 years in railway service. In October, 1895, Mr. Kruttschnitt was appointed general manager of all the Southern Pacific Lines with headquarters in San Francisco. In 1901, following the Union Pacific's acquisition of a controlling interest in the Southern Pacific, E. H. Harriman was elected president of the latter and Mr. Kruttschnitt was given the additional titles of fourth vice-president and assistant to the president. As a result of Mr. Harriman's

willingness to delegate responsibility to those in whom he had confidence, this, in effect, put Mr. Kruttschnitt in executive charge of the property.

In April, 1904, Mr. Kruttschnitt was transferred to Chicago with the title of director of maintenance and operation of the "Harriman Lines," including, therefore, the Union Pacific, the Oregon Short Line, the Oregon-Washington Railroad & Navigation Company and the Southern Pacific. In 1911, in connection with a somewhat elaborate rearrangement of the Harriman Lines, he was transferred to New York, and in 1913, upon the segregation of the Harriman System, he returned to the Southern Pacific with the title of chairman of the executive committee with, of course, considerably more active duties than sometimes accompany a title of that kind.

Thus, Mr. Kruttschnitt spent his early years in railway service and in railway construction, at that time when there was under way one of the most active periods of railway expansion. He went through that period of amalgamation when the Southern Pacific was extending from its original territory in California to Texas, Louisiana and the Gulf of Mexico. He was one of Mr. Harriman's right-hand men in the greatest amalgamation the country has ever known, the merger of the Union Pacific and Southern Pacific systems. The fact that he was in charge of maintenance and operation of the combined properties is important because Harriman was noted for his insistence on high standards of maintenance and operation. However, Mr. Kruttschnitt saw that amalgamation broken up. He further saw the opposition to amalgamation continue beyond even that to the point where another Supreme Court decision ordered the divorce of the Central Pacific—an integral part of the Southern Pacific. On the other hand, he saw the change in public sentiment embodied in the consolidation pro-



Julius Kruttschnitt

visions of the Transportation Act, and was alive enough to the situation to appeal under the new law to the Interstate Commerce Commission and thereby retain the Central Pacific in the Southern Pacific. Carrying the new policies still further, he acquired the El Paso & Southwestern, and in these two instances probably did more than anybody else, except possibly the Van Sweringens, has thus far succeeded in doing in meeting the public's new desire for railway amalgamation.

Recent Development of Southern Pacific

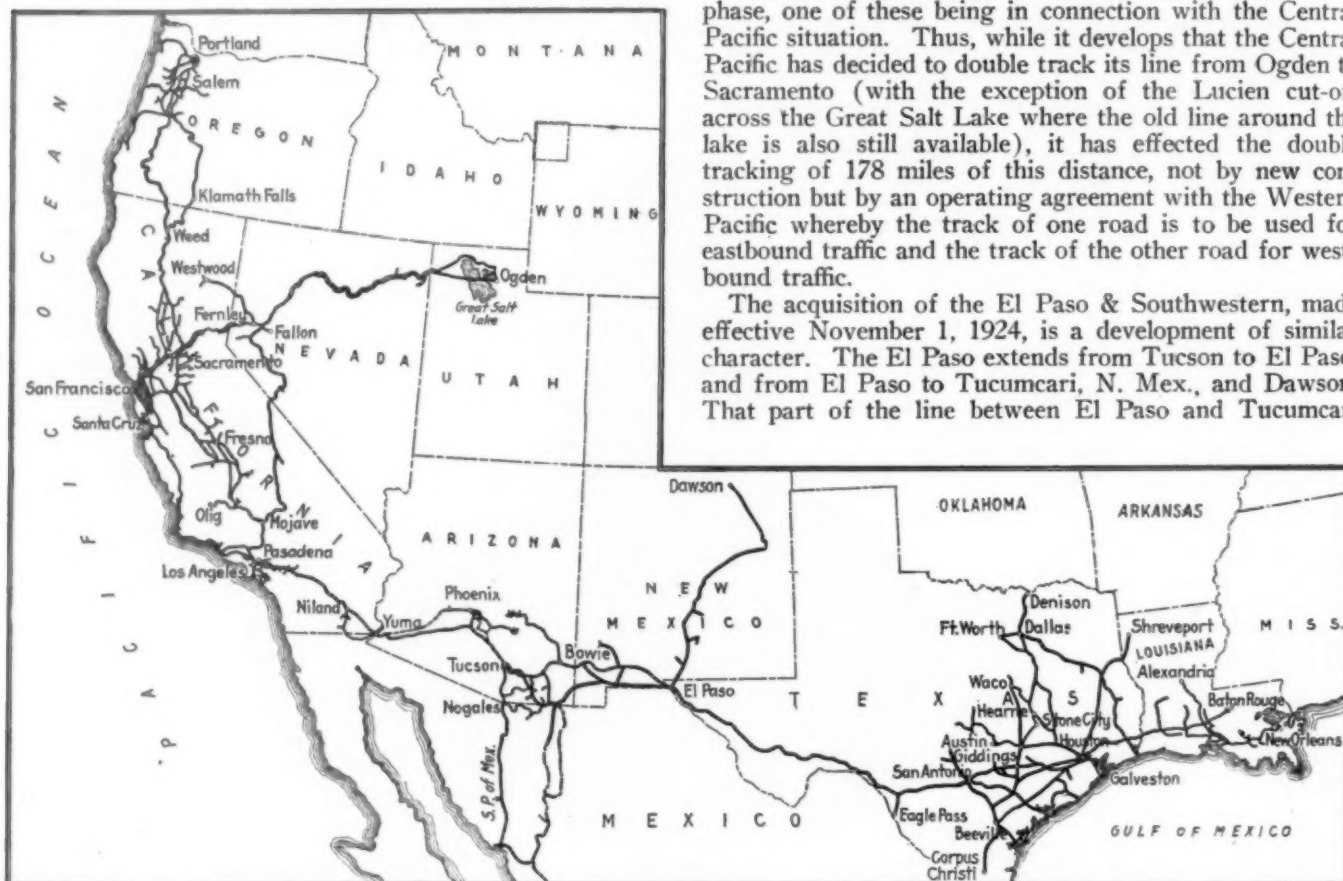
The earlier parts of Mr. Kruttschnitt's railway career were contemporaneous with a period of railway expansion; later years of it—particularly those years im-

Natron cut-off between Kirk, Ore., and Oakridge. The latter project includes 118 miles of new construction. It is one of the largest projects under way in this country at the present time. The Natron line parallels the Southern Pacific's present line through the Siskiyou mountains with a line crossing the Cascades. It will reach a virgin lumber country and is expected to assist in developing an increased live stock and dairying industry.

Avoidance of Needless Duplication

One of the new features of the public's attitude toward railroads in recent years has been its questioning of the desirability of the necessity for needless duplication of railway facilities. The Southern Pacific has carried out two interesting developments in connection with this phase, one of these being in connection with the Central Pacific situation. Thus, while it develops that the Central Pacific has decided to double track its line from Ogden to Sacramento (with the exception of the Lucien cut-off across the Great Salt Lake where the old line around the lake is also still available), it has effected the double tracking of 178 miles of this distance, not by new construction but by an operating agreement with the Western Pacific whereby the track of one road is to be used for eastbound traffic and the track of the other road for west-bound traffic.

The acquisition of the El Paso & Southwestern, made effective November 1, 1924, is a development of similar character. The El Paso extends from Tucson to El Paso, and from El Paso to Tucumcari, N. Mex., and Dawson. That part of the line between El Paso and Tucumcari



The Southern Pacific

mediately preceding and those immediately following the world war—were years of comparative railway stagnation due to the effects of overly severe railway regulation in the one case and to the after effects of federal control in the other. More recently there has been a revival of railway prosperity and of railway expansion. It is significant that the two phases have been particularly exaggerated in the case of the Southern Pacific because of the continuing uncertainty with reference to the company's being allowed to retain its ownership of the Central Pacific. Other parts of the system were gradually developed but an improvement program relating to the Central Pacific had to be held in abeyance as long as the company's title to it was in question. No sooner was the question settled in the Southern Pacific's favor than the program was resumed. It has thus far included, in particular, the resumption of the work of double-tracking the Ogden-Sacramento line begun many years ago, and the decision to proceed with the long-planned construction of the

forms a link in the Southern Pacific-Rock Island route to Chicago, and its acquisition is more important as a phase of railway consolidation of connecting lines. The line between El Paso and Tucson, however, is another example of the avoidance of needless duplication of lines because its acquisition by the Southern Pacific gives the latter property, in effect, a double track line in a district where the company greatly needed additional trackage to handle its growing traffic. In this connection, as in the case of the Natron cut-off, another of the country's largest construction projects is involved because as a part of its taking over the El Paso & Southwestern the Southern Pacific also agreed to construct new lines aggregating 170 miles in length, which will put Phoenix, Ariz., on a main line and will also have the effect of giving the property a double track route from the Colorado river east to Picacho, Ariz., which is about 70 miles west of Tucson. Except for this 40 miles and 15 miles in another place therefore, the Southern Pacific will

have the equivalent of a double-track line between Tuma, Ariz., and El Paso.

Southern Pacific de Mexico

Some years ago the Southern Pacific built a line down the west coast of Mexico, which was intended eventually to form with other roads in Mexico a more direct route to the Mexican capital. As a result of the revolution in Mexico, which began in 1910, construction of this line was stopped prior to its completion. During the revolutionary period the railroad suffered severely, traffic was interrupted, much of the equipment was destroyed and during 1915 an average of a trestle a day was burned from January 1 to January 31. The situation in Mexico has now so improved as to have permitted restoration of the line formerly built and by an agreement with the Mexican government, indemnity for the destroyed line is being used for the completion of the original project. The work now under way calls for the building of the link between Tepic and La Quemada. The line, when completed, will extend from Nogales, which is south of Tucson, to Orendain, slightly over a thousand miles, and will connect at the latter point with the National Railways of Mexico, which have a line from that point via Guadalajara to Mexico City.

Presumably, the next step that Mr. Kruttschnitt would have liked to have taken had he continued longer as the head of the Southern Pacific, would have been to effect some kind of an arrangement—traffic agreement or consolidation, whatever it might have been—with the Rock Island to carry out the joining up favored in so many quarters, of the Southern Pacific-El Paso-Rock Island line to Chicago. However, it is noteworthy that Mr. Kruttschnitt completes his work with the Southern Pacific at a time when several large problems to which he must have given much thought during the past twelve years have finally come to the point of solution.

One Unsolved Problem

It is true that Mr. Kruttschnitt has been unable to solve the problem offered by the competition of the Panama Canal and the refusal of the Interstate Commerce Commission to permit the transcontinental railroads to compete with the canal for coast-to-coast business. As against this fact, however, is the circumstance that the Southern Pacific is at present progressing markedly in spite of the loss of business to the steamship lines using the canal. Until comparatively recently the railway situation in Texas, where the Southern Pacific has so much of its mileage, was not good. However, this situation is now changed so that the railways in the Southwest are among the most prosperous in the country. This has been very largely due to oil development and to the increased buying power of the Southwest due to oil production. The Southern Pacific has benefited from this. Two of the largest and most spectacular oil developments in the state, notably the development in 1922 at Mexia, and in 1924 at Wortham, were on lines of the Southern Pacific. It is, of course, to be understood that the railroad does not get its revenue from carrying crude oil but rather from bringing in the oil-well supplies and from the traffic to the rapidly growing communities.

Public Relations

There is no question but that much of the recent progress that the Southern Pacific has made, notably its retaining of the Central Pacific, and its acquisition of the El Paso & Southwestern, has been due to a skillful public relations policy and willingness to play fair with the public. At the time when Mr. Kruttschnitt first came to San Francisco in 1895, the Southern Pacific was not in

good repute in California. Various reasons have been given as to the cause of this but it is generally believed that the chief reason was that the company had a monopoly in California and had acted with a "take it or leave it" attitude. This did not continue long after Mr. Kruttschnitt had become an executive head of the property in 1895. One of the things that he did, for example, was the adoption of an unusual and open-minded attitude with reference to accident investigations. The study and prevention of accidents has always been a hobby of Mr. Kruttschnitt. In this particular case, however, he suddenly announced that accident investigations were going to be open to the public and, furthermore, he adopted a procedure whereby investigating boards would include as their members local business men or other leaders in the communities in which the accidents occurred.

Mr. Kruttschnitt, in his first annual report issued in 1913, (twelve years ago), had an interesting expression of opinion with reference to public relations policies. The statement read:

"The officers of your company are too few in number to exert much influence on public opinion, and a large part of their time and energy which should be devoted to that end, and to promoting safer and more efficient management, is consumed in appearing before commissions, to protect the company's revenues, and before legislative bodies, to argue against ill advised and damaging laws. The present is an age of regulatory legislation, the stockholders should endeavor to defend their own interests by opposing unwise legislation adversely affecting their company, and by correcting erroneous impressions current with the public. The ownership of your property is vested at the present time in over 23,000 stockholders, who could and should prove a potent protective force. Apathetic acquiescence on their part in the assaults of the demagogue and of the well intentioned though unenlightened and irrational reform, tends toward but one result, while concerted effort will do much to repel the attacks and mold public opinion.

"The management has labored energetically to conciliate the people of the communities traversed by the company's lines. As far as possible, the officers of the company have attended commercial and other public gatherings with a view to learning their needs and opinions, in order to improve our service and promote harmonious relations between the company and its patrons. The management is pleased to report the evidence of better feeling toward the company in these communities than has ever before existed."

In the above quotation, it is noted that in 1913 the company had 23,000 stockholders. On December 31, 1924, it had 57,512 stockholders. It is significant that this information is the first thing appearing in the annual report following the name of the company itself.

Operating Statistics

Mr. Kruttschnitt is one of the number of railway executives who are favored with an engineering training. He brought the results of this training to railway service at a time when railroading was done by rule-of-thumb methods rather than conducted as a science. He has probably done as much as any other railway executive to make railroading into a science. One example is the amount of attention that he has given to the subject of railway operating statistics. It is generally understood that when Professor W. J. Cunningham of Harvard University organized the operating statistics section of the Railroad Administration, he and his committee drew upon the statistical methods of the Southern Pacific more than on those of any other carrier. It is of present importance because the operating statistics now required by the Interstate Commerce Commission are based on those formerly required by the Railroad Administration. Mr. Kruttschnitt was one of a committee of the Association of Railway Executives which worked with the Commission when it decided to continue the Railroad Administration operating statistics.

There are many railroad officers who do not have as much faith in operating statistics as they might. One

of the important features of Mr. Kruttschnitt's statistical method was the fact that he always insisted upon the proper use of statistics, and probably there is no other road on which the division superintendent is held to more exact account for proper explanation for changes in the operating results as shown by his own statistics.

Fuel Economy

This scientific analysis of railway operation is reflected by the importance that Mr. Kruttschnitt has always given to two other phases of railway operation, one being fuel economy and the other accident prevention. This is evidenced in no better way than in the Southern Pacific's annual reports. If one will go back in these reports to the report for 1913, the first to which Mr. Kruttschnitt's name was appended, he will find a graphic chart headed "Fatalities in Train Accidents" and nearly a page of the report devoted to safety of operation. This graphic chart for many years was a regular feature in the Southern Pacific's reports.

The attention given to fuel is reflected in the report for 1915 in which, for the first time, appears the notation of a new statistical unit, namely, gross ton-miles per pound of locomotive fuel. This unit has since become known as pounds of coal per thousand gross ton-miles. So well has Mr. Kruttschnitt's insistence on the subject of fuel conservation been felt in the Southern Pacific that in 1924 the figure of the Southern Pacific System was 136 and of the Lines in Texas and Louisiana 121, as compared with the average of 148 for the western district, and of 149 for the United States as a whole. Much of the leading and constructive thought on this subject in the United States has been contained in papers read by Mr. Kruttschnitt before railroad or other technical associations. Some of his papers on this subject and on the more general topic of economy of railway operation are classics.

The Southern Pacific System

The Southern Pacific Transportation System operates at the present time 12,447 miles of railway and 1,325 miles of water lines. Including the Pacific Electric, the Southern Pacific of Mexico, which it controls, and the San Diego & Arizona and the Northwestern Pacific and the Sunset Railway in which it has a half interest, the total mileage of railway becomes 15,533. The Company's lines extend from New Orleans to Los Angeles, to San Francisco and as far north as Portland, Ore. in addition to which is the Central Pacific line from Ogden and steamship lines from New Orleans to New York.

The company's investment in road and equipment, including the Pacific Electric and the Southern Pacific of Mexico and the three controlled lines mentioned, exceeds \$1,000,000,000 in 1924, the company had total operating revenues of \$275,904,111, its operating expenses were \$203,051,329 and its net railway operating income was \$48,101,116. These figures included the operations of the El Paso & Southwestern for two months. The rate of return on the company's investment for 1924 was 3.99 per cent, and the average for the past four years was 4.11 per cent. The company's net income after charges was \$35,754,418. This was a decrease of \$8,798,067, or 19.75 per cent as compared with 1923. It was equivalent to 10.24 per cent on the company's outstanding stock of which 8.03 per cent was from railroad income and 2.21 per cent from other income.

CONSTRUCTION OF A railroad from Culiacan to Tepihuanes, Mexico, 170 miles, is contemplated by Texas capitalists, according to advices to the Wall Street Journal. Tepihuanes is the western terminus of a branch line of the National Railways of Mexico and Culiacan is on the Southern Pacific.

Freight Car Loading

WASHINGTON, D. C.

FREIGHT car loading for the week ended May 30 totalled 920,514 cars, an increase of 99,963 cars as compared with the corresponding week of last year but a decrease of 12,170 cars as compared with 1923. Because of the Memorial Day holiday this was also a decrease of 65,695 cars as compared with the preceding week of this year. Increases as compared with the corresponding week of last year were shown in all districts and in all classes of commodities except live stock, which showed a reduction of 2,321 cars. Coal loading showed an increase of 28,490 cars and miscellaneous freight an increase of 48,610 cars. Grain and grain products, merchandise and miscellaneous freight also showed an increase as compared with 1923. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

REVENUE FREIGHT CAR LOADING--WEEK ENDED SATURDAY, MAY 30, 1925

| Districts | 1925 | 1924 | 1923 |
|--------------------------------|------------|------------|------------|
| Eastern | 210,896 | 186,275 | 224,267 |
| Allegheny | 184,378 | 164,636 | 209,318 |
| Poconantas | 48,797 | 37,472 | 40,483 |
| Southern | 139,623 | 123,417 | 128,528 |
| Northwestern | 140,964 | 131,980 | 152,323 |
| Central Western | 129,248 | 123,632 | 125,218 |
| Southwestern | 66,608 | 53,139 | 52,547 |
| Total Western | 336,820 | 308,751 | 330,088 |
| Commodities | | | |
| Grain and grain products..... | 37,283 | 36,214 | 32,401 |
| Livestock | 25,161 | 27,482 | 29,257 |
| Coal | 148,700 | 120,210 | 171,666 |
| Coke | 9,207 | 8,176 | 14,389 |
| Forest products | 71,905 | 67,701 | 73,659 |
| Ore | 60,056 | 56,335 | 73,387 |
| Misc., l.c.l. | 230,159 | 215,000 | 216,763 |
| Miscellaneous | 338,043 | 289,433 | 321,162 |
| Total | 920,514 | 820,551 | 932,684 |
| May 23 | 986,209 | 918,224 | 1,015,532 |
| May 16 | 984,916 | 913,201 | 992,319 |
| May 9 | 981,370 | 908,203 | 974,741 |
| May 2 | 981,711 | 913,550 | 961,617 |
| Cumulative total 22 weeks..... | 20,341,617 | 19,559,970 | 19,957,899 |

Car Loading in Canada

Revenue car loading at stations in Canada for the week ended May 30 totaled 46,103 cars, the effect of the holiday on May 25 being apparent. Grain loading was light and coal also continued light. Compared with the same week last year the total showed a decrease of 12,540 cars. It was also 6,862 cars less than the loadings for the week ended May 24, 1924, the week containing the holiday last year. The decreases were principally in grain and coal.

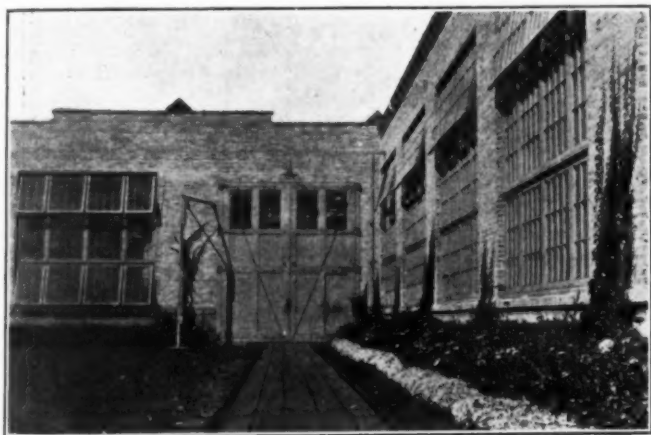
| Commodities | Total for Canada | | | Cumulative totals to date | |
|--|------------------|--------------|--------------|---------------------------|-----------|
| | May 30, 1925 | May 23, 1925 | May 31, 1924 | 1925 | 1924 |
| Grain and grain products.... | 3,924 | 5,489 | 11,728 | 132,555 | 177,805 |
| Live stock..... | 2,055 | 1,968 | 2,426 | 48,534 | 48,006 |
| Coal | 1,384 | 1,989 | 4,824 | 86,407 | 105,690 |
| Coke | 418 | 191 | 255 | 6,460 | 5,401 |
| Lumber | 3,668 | 4,205 | 3,802 | 70,873 | 77,356 |
| Pulp wood..... | 2,099 | 2,047 | 2,141 | 71,435 | 73,747 |
| Pulp and paper..... | 2,016 | 1,830 | 1,987 | 46,016 | 45,885 |
| Other forest products..... | 2,588 | 2,683 | 2,365 | 66,020 | 62,713 |
| Ore | 1,639 | 1,507 | 1,258 | 26,922 | 23,064 |
| Merchandise L. C. L..... | 14,058 | 15,985 | 15,524 | 323,127 | 301,311 |
| Miscellaneous | 12,254 | 13,058 | 12,333 | 238,275 | 241,807 |
| Total cars loaded..... | 46,103 | 50,952 | 58,643 | 1,116,624 | 1,162,785 |
| Total cars received from connections | 33,385 | 33,196 | 29,203 | 729,197 | 741,707 |

THE LAW OF NEW YORK requiring all locomotives to have side vestibule cabs, which has been before the courts for years, because of the refusal of the Public Service Commission to enforce it, has finally been nullified by the Court of Appeals, which on June 9 handed down a decision sustaining the commission in its ruling. The commission held that as the federal law covered the whole field of locomotive inspection, the state had no power to act. The firemen's brotherhood challenged the judgment of the commission and entered the suit to compel it to recognize the statute.

A Compact Shop and Terminal Plant for a Small Railroad

Lake Superior & Ishpeming layout at Marquette, Mich., embodies a number of unusual features

A UNIQUE and ingenious coaling plant, non-inflammable roof, snow disposal facilities in the turntable pit and especial attention to landscape gardening are distinctive features of the engine terminal and repair shop recently completed by the Lake Superior & Ishpeming at Marquette, Mich., which comprise a distinctive example of a compact layout designed to meet the requirements of a small railroad. The plant as now constructed represents the completion of a project undertaken early in 1918 and carried out in two distinct contracts, a part of the plant being completed in 1919 and the remainder, undertaken as a second step in the fall of 1922 and finished about a year later. In preparing the plans for this shop and locomotive terminal, the engineers of the railroad had the advantage of a new site which enabled them to proceed without the necessity of fitting the new work



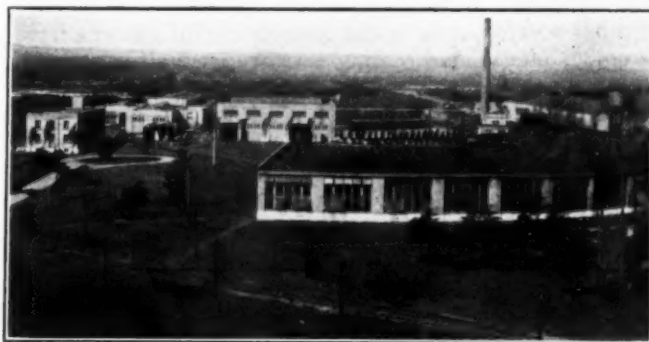
Paint Shop and Wood Shop

to existing structures. Also, the fact that the site was partly wooded and on the shore of Lake Superior made it possible to use much of its natural beauty in developing the landscaping effect.

As seen in the block plan the track layouts of the engine terminal and of the repair plant are entirely independent, except for a direct connection between the shop tracks and the turntable. The only other feature that is essentially common to both is the power plant which serves both units.

The engine terminal comprises a 20-stall roundhouse with an 80-ft. turntable, a coaling plant, a 50,000-gal. wooden water tank, a 14-ft. by 52-ft. sand house and a 15-ft. 5-in. by 61-ft. wet-type cinder pit. The roundhouse has brick and concrete walls, and a timber frame and roof and is covered with Johns-Manville five-ply asphalt-asbestos roofing. It is heated by hot air distributed by a fan through concrete and vitrified pipe ducts from steam coils in a room located in the rear of the house. Owing to the low winter temperatures experienced the downspouts from the roof gutters are carried inside the building.

The requirements of a cold climate are carried out in greater measure in the turntable pit. This is provided with a solid concrete pavement and a catch-basin so arranged that when desirable the bottom of the pit can be made to hold about a foot of water. Service pipes for both water and steam entering the pit afford the means of

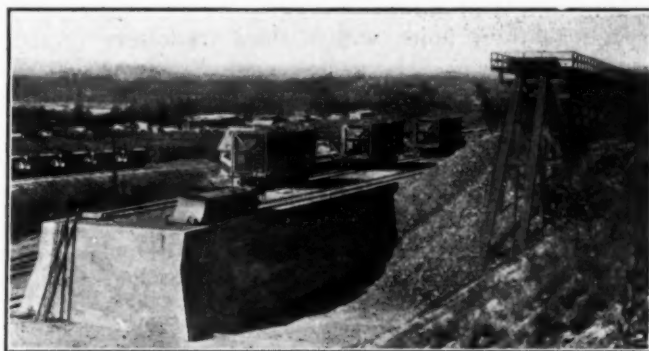


General View from the East—Top of Ore Dock

keeping the bottom of the pit covered with hot water to melt snow as it falls as well as such snow as may be deposited in the pit by a locomotive crane used to clear the space between the inside circle wall of the roundhouse and the turntable.

A Unique Coaling Station

The most unique feature of the terminal is the coaling plant, which has been designed to afford the most con-



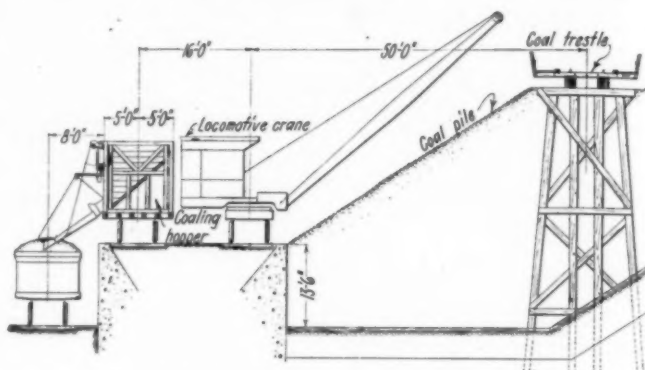
East End of Coaling Plant—Storage Capacity 30,000 Tons

venient method of handling coal unloaded from a nearby dock. Ore cars into which the coal is loaded at the dock are dumped from a pile trestle 630 ft. long built against the slope of the ore dock approach. This slope has been covered with planking, causing the coal to move down the slope towards a coaling dock 13½ ft. high, consisting of an earth fill 27 ft. wide supported between two concrete retaining walls. This coaling dock supports two tracks, 16 ft. center to center, which are used for loading coal from the storage pile under the trestle into three es-

pecially constructed locomotive coaling cars by means of a locomotive crane. The locomotive crane occupies the inner track and the coaling cars the outer track where they are located in a suitable position for discharging coal directly into the tenders of locomotives occupying a track on the surface adjacent to the dock. The space under the trestle between the embankment and the coaling dock affords room for a coal pile of 30,000 tons. The locomotive coaling cars are spotted anywhere within the length of 504 ft. of the dock, depending on what portion of the coal pile is to be worked, the locomotive being spotted opposite the cars in whatever position they may happen to be. The cars are of wooden construction and are divided into three pockets, each of which is equipped with an apron and gate for the delivery of coal and a capacity equal to that of the average tender. The advantage of this arrangement is that after the crane has loaded all three cars, adequate storage capacity has been provided for coaling nine locomotives so that the crane may be used for other service, such as the loading out of cinders from the cinder pit. These coaling cars are used also for loading out company coal into cars for use on other portions of the line.

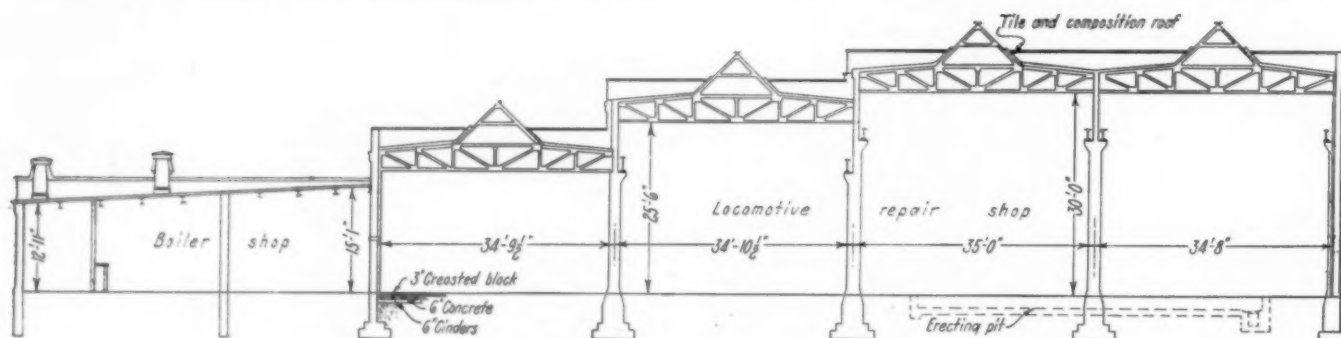
The shop buildings are of a size and character to meet

woodworking mill and a fourth serving only the car repair shop. Another group comprises the locomotive machine and erecting shop and the blacksmith shop, the former being served by five tracks, all of which are pro-



A Unique Type of Coaling Plant

vided with engine pits and one of them with a Whiting locomotive hoist. The buildings have brick and concrete walls, steel frames and roof trusses and pre-cast gypsum

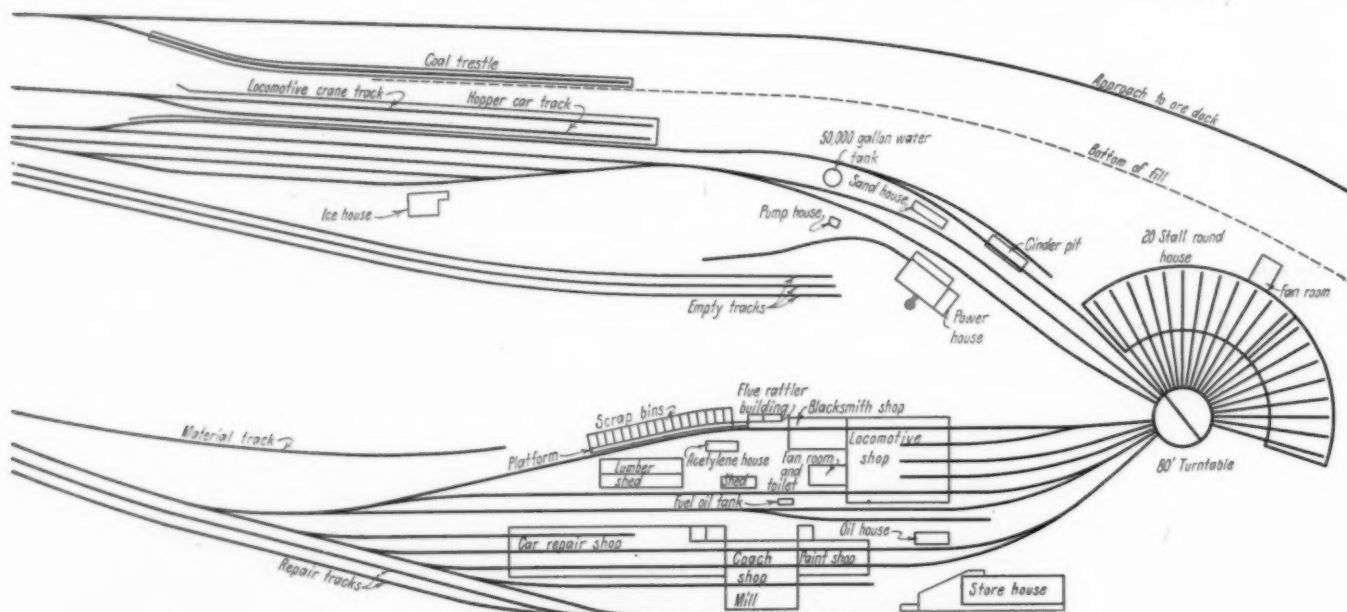


Typical Section of the Locomotive Shop

the needs of a small railroad and are grouped in a compact arrangement possible only with a small layout. Thus, the car repair facilities comprise a building of three units, the car repair and steel shop, the coach shop and woodworking mill, and the paint shop. Two tracks extend through all three units, with a third track serving the

roof slabs covered with Johns-Manville asphalt-asbestos roofing. The roof trusses are of peculiar design, affording an A-frame monitor or single saw-tooth skylight at mid span equipped with Pond metal frame continuous operating sash.

The car repair shop has a main bay, 25 ft. 3 1/2 in.



General Layout of the Shops and Engine Terminal

clear under the roof trusses, provided with a 10-ton crane having a span of 44 ft. 4 in. from center to center of the crane rails, together with a side bay 20 ft. 10 in. wide. The locomotive shop is divided into four bays transverse to the tracks with spans ranging from 34 ft. 10 in. to 35 ft., three of which are provided with five-ton cranes for handling locomotive parts. The clear height under the roof trusses in this shop varies from 18 ft. to 30 ft. Adequate toilet facilities and locker rooms are provided in connection with both the locomotive and car shops.

Other features of the shop layout include a two-story brick storehouse, 40 ft. by 143 ft., an oil house, 28 ft. by 48 ft., a flue rattler building, a material shed, an acetylene

generating house 14 ft. by 44 ft., a lumber shed 40 ft. by 115 ft., and a battery of scrap bins 20 ft. by 200 ft. The power house, 50 ft. by 65 ft. is designed primarily for the supplying of heat to the various units of the plant, as electricity for both lighting and power is purchased from the Cleveland Cliffs Iron Company's hydro-electric plant, with a breakdown connection with the hydro-electric system of the city of Marquette.

The shop and locomotive terminal layout was designed and built under the direction of R. C. Young, chief engineer of the Lake Superior & Ishpeming, Marquette, Mich. Plans were prepared and all construction work was carried out by the Arnold Company, Chicago.

How to Purchase Malleable Castings*

An outline of practical points to be considered in buying this material most economically

By H. A. Schwartz

Manager of Research, National Malleable and Steel Castings Company

THERE are some two hundred producers of malleable cast iron in the United States. In principle, all of these operate upon the same metallurgical principles and under the same limitations, although they differ greatly in size, resources, technical skill and reputation. Differences in price exist within this industry, as in all others, and again as with most others the buyer gets approximately what he pays for. No producer could continuously maintain a price above the average, unless he furnished something for it, nor can any producer remain in business at a profit while selling far below the market, unless something of quality, care, service, or satisfaction is left out of his product.

Those who have followed the specifications laid down by the American Society for Testing Materials are aware that the standard has constantly risen. Contrary to the common belief, this improvement has not cost the consumer anything in the form of increased labor or material cost to the producer. He does pay something for this improvement in the form of increased overhead for equipment and supervision, and possibly something for increased foundry difficulties, although the existence of this differential is doubtful.

It may be an open question whether or not the requirements are better met by malleable of the so called "certified" grade; i.e., conforming to the A. S. T. M. requirements, than they would be by an inferior product. Much depends upon the intended use and very probably the answer is not the same for all purposes.

How to Avoid Unnecessary Cost

A most important source of increased production costs for a given casting is to be found in the care taken by the foundryman to produce mechanically sound castings. The hard iron casting shrinks about $\frac{1}{4}$ in. per ft. during the process of freezing and cooling; about twice as much as gray iron. Since, of necessity, the surface of a casting freezes first, it follows that when cooling is complete there is too little volume of metal to fill the outer shell, and somewhere there are voids. This difficulty is met in the foundry

by feeders, whose function is to supply molten metal to the interior of the casting itself, during freezing. The shrink is thus transferred from the casting to the feeder. Other methods exist also.

All of these precautions cost money, for they increase the work required of the molder and the percentage of remelt. These precautions should neither be demanded nor paid for, if a sound casting is not required. For example, it is not economy to spend money to eliminate a shrink in the center of a boss which later will be drilled out. On the other hand, it is equally foolish to demand a material of superior quality and not be willing to pay enough to have that material utilized to the best advantage.

Malleable castings have established a reputation for surface finish and the consumer has come to demand this, usually advisedly. Surface perfection, however, costs money in molding precaution, rejections, careful grinding, etc.

It is to the interest of every producer of malleable castings, to curtail his annealing time as far as possible. It decreases the investment in equipment and castings proportionately, the fuel consumption, slightly avoids difficulties from excessive decarburization, and gives the customer an earlier delivery. If on the other hand, too little time is allowed an inferior product results for any purpose for which a malleable casting is usually required.

The purchaser would seem to serve his own interests best by not exerting pressure on the vendor toward a reduction in this time, for by so doing he runs a constant risk of obtaining inferior work. Manufacturers are fully conscious of the desirability of such reductions, to the extent of having spent thousands of dollars in investigations in this direction and, from self interest alone, are compelled to bend every effort toward such improvements. The annealing reaction proceeds at all points of the casting at once, and not from the outside in, as was true of the European process. The surface metal is but slightly more ductile or stronger than the center. The machining of castings does not, therefore, materially weaken them as commonly believed. The center of the casting is not ordinary cast iron, never was gray iron and bears no relation to that metal. Castings of such form that the various

* Presented at the annual convention of the National Association of Purchasing Agents at Milwaukee, Wis., May 26.

portions cool at very uneven rates, or which have heavy sections so situated that feeders can not be applied, will suffer from such defects in spite of almost anything the foundryman can do. Until draftsmen view their creations, not only from the viewpoint of application but also of manufacture, much needless trouble and expense will be incurred.

Whenever possible, when new designs are contemplated, competent advice should be sought from the producer. No advantage, whatever, results from making him do metallurgical tricks. It is distinctly in the writer's knowledge that a large consumer is today buying a casting which only two or three producers can manufacture with any satisfaction. Such a condition is not to the buyer's advantage.

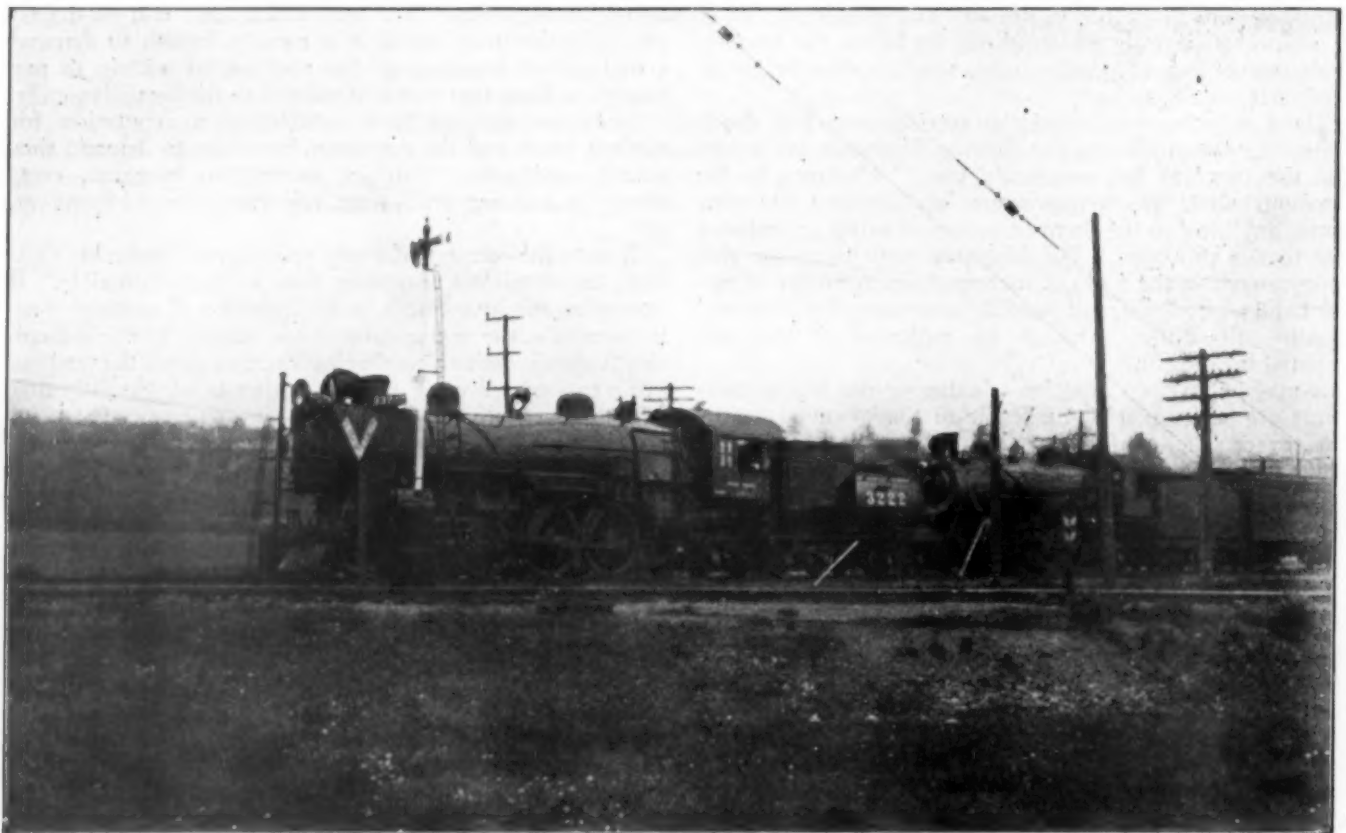
It should be reasonably possible for the prospective user to settle in his own mind whether or not a malleable casting is suited to his needs. No one material is suited to every purpose, and malleable iron is no exception to this rule. In the long run, it is no more to the producer's interest than to the consumer's, that a material should be used for a purpose to which it is not well adapted. Nor is it desirable from any viewpoint that, from economic pressure, the quality of any given material be reduced until it becomes doubtful whether or not it will meet the requirements.

The user should decide after careful study just what he requires in the way of physical properties, and select from the commercially available products that which best meets his wants. As evidence of the unbiased character of the advice which follows, reference is made to the fact that the corporation with which the writer is associated manufactures gray iron, malleable, ordinary, and special high quality steel castings.

On a strict price per pound basis, cast iron is always the most available metal. Wherever mere mass is desired or where castings are not to be subjected to considerable stresses except in compression, it will always be chosen. It is also the best available material for use in engine cylinders, for example, and some very intricate work can be cast in no other ferrous metal. It is quite machineable, though normally less so than malleable castings, and by special processes which will bring its cost to a figure more nearly comparable with malleable its machineability can be increased to make it the easiest machining product available. Its greatest handicap is the absence of ductility, which distinctly limits its application, especially in parts not massive, where impact or tensile stresses may exist.

At the other end of the list stand castings where high unit stresses are of the utmost importance. Here the steel casting, and especially the heat treated alloy steel casting, is indicated. This is especially true where the article is of considerable cross section and weight. In this connection it must be remembered, however, that steel castings are never as sound as those of the other two materials. The steel casting requires a somewhat larger safety factor to cover the presence of blow holes and shrinks, which are unavoidable in present manufacture.

In the intervening field, where castings must be ductile, or magnetically permeable, and perfectly machineable, as well as substantially sound, and of somewhat restricted cross section, the malleable casting finds its best application. Even in this field, there may be instances where a very high grade and costly steel casting is indispensable, or where an unwarranted risk is incurred, a weight needlessly increased, and gray iron used. In general, however, in this field a properly designed malleable casting will give more economical service than any other ferrous material.



Locomotives Used for Hauling a Silk Train from Seattle, Wash., on the O. W. R. & N.

Mid-West Transportation Conference*

*Concluding report of Chicago meeting of May 27-28—
Papers by Messrs. Powell, McKay and Jardine*

T. C. POWELL, vice-president in charge of traffic of the Erie, in a paper which was read by F. G. Robbins, vice-president at Chicago, pointed out the need for better organization in the handling of goods between terminals and consignees. Single package consignments, he said, are becoming more and more numerous since the automobile has revolutionized merchandising. A part of Mr. Powell's paper follows:

In the larger cities the rentals are so high that few merchants can afford to maintain sufficient storage space for more than two or three days merchandising, with the result that single-package consignments are becoming more and more numerous, and the large bulk deliveries are becoming less and less. This is sometimes called a hand-to-mouth policy of purchasing and sometimes considered an indication of poor business, but this is not true in every instance nor to any large extent. The automobile has revolutionized merchandising, but the provisions for making this new method of jobbing a success have lagged behind.

The problem is being solved in England by the construction of new trunk roads. Some of these are being built at a cost of millions of dollars by the public authorities out of the funds contributed from license receipts, and it is now proposed to build one or more of these motor highways at private cost, charging a toll, and even at the moderate figures proposed it is expected the receipts will pay a substantial profit on the investment.

I believe the solution of the city terminal problem is to be found in the elimination of unauthorized obstructions; in the maximum widening of streets which will be easily possible when property owners keep their building and merchandise within their own property lines; in restricting the size of vehicles allowed to use the city streets, as recommended by the police officials; in the construction of by-passes or trunk roads around the thickly populated sections of the country, so that the through movement may be direct, as is being done in England and on the continent; and in the adoption by the railroads and the merchants of a system of distribution and collection through the use of the motor truck or horse-drawn vehicle between the railroad freight stations and platforms on the one hand, and the public warehouses and off-line freight stations of the railroad and the merchant's warehouse on the other hand.

There are several phases of this kind of service:

The store-door delivery which prevailed at one time in some of the eastern cities but was discontinued because of the opinion of the commission that the plan was subject to discrimination.

The collection and delivery of freight between the railroad freight station, on the one hand, and the merchants' warehouses on the other hand, through the medium of a public transfer company working under contract

with the shipper, but with only a limited contract with the railroad company—the contract with the railroad company being restricted usually to establishing the responsibility of the transfer company.

A third method is the well-known plan of the individual draymen of serving one customer, or perhaps several customers, and trying to effect delivery or to make prompt collection of the freight to and from the railroad station. This class of service, because of its general nature and the difficulty of classification, is usually the least efficient, and results in the greatest congestion.

The Erie was the first to institute on Manhattan Island a system of terminal collection and delivery which took into account this combination of interests. We did not originate the plan because what we are doing in New York City is based upon what has been in effect at St. Louis for years. We believe that the intermediate or off-line warehouse is a necessity in New York City. We believe that a warehouse in connection with a railroad terminal is desirable in every city.

Much can be accomplished if the shipper and consignee will enter into the proper arrangements with reliable trucking concerns to act as their agents with the railroad companies, because through this means the stations will be relieved more quickly and the full loads will be handled where only partial loads can be handled under individual arrangements. This plan is in vogue in Chicago and other cities.

Whether or not the majority of merchants desire the railroads to establish store-door delivery and collection, and to assume the entire responsibility throughout the entire transaction from door to door, is a question which has not been settled definitely.

Simply because the collection and delivery system by the railway companies has been generally approved in Great Britain, is not conclusive that it would be a satisfactory system in the United States. There is no point in that country more than 100 miles from salt water. A carload of freight in England is frequently no more than a small less-than-carload consignment over here. The conditions surrounding the collection and delivery, and especially the period of time between shipping point and destination, are so different that I do not believe we can learn much from their practices—not because I object to studying foreign methods but because I believe those particular methods are not adjustable to the United States.

J. F. Murphy, vice-president of the Columbia Terminals Company, St. Louis, Mo., in discussing Mr. Powell's paper, declared that he considers the off-track station the solution of the terminal problem and pointed out the results which have been obtained by his company in the St. Louis terminals. The essential principle of economic terminal operation, he said, is an even flow of freight through the freight houses during the entire day.

Trucks Not Competitors of Railways

Dr. J. Gordon McKay, of the United States Bureau of Public Roads, in a paper on "Commodity Transportation by Motor Truck," said that the bulk of truck traffic

is short local traffic and that trucks are therefore not competitive with the railways. He stated also that the long haul transportation of all kinds of freight by trucks cannot be carried on economically and that truck operators should confine their operations to short haul delivery

* Other papers and proceedings were given in the *Railway Age* of June 6, page 1407.

to consumers and retailers if they wish to make a profit. Following is an abstract of Mr. McKay's paper:

The bulk of the motor truck movement is a local, short-haul transportation of goods. The mileage zones of haulage vary, depending upon (1) prevailing production in the area, (2) shippers' distance from market, (3) type of highway improvement, and (4) the distance between centers of population. Comparisons of truck haulage in Connecticut, Maine, California, and Cook County, Illinois, indicate clearly the predominance of the short-haul movement.

The principal movement of loaded trucks occurs within a zone of 29 miles or less in Connecticut, California, Maine and Cook County. In Connecticut 79.5 per cent, California, 60.7 per cent, Maine, 80.5 per cent and in Cook County, Illinois, 75.8 per cent of the loaded trucks move less than 30 miles. In Connecticut and Maine, 47 per cent move less than 10 miles. A small percentage of the truck movement exceeds 60 miles, in Connecticut, 7.9 per cent, Maine, 6.6 per cent and in Cook County, Illinois, 5.4 per cent.

The larger portion of motor truck transportation is a direct distribution of commodities to their final use. Trucks destined to consumers and retail establishments, making up 43.5 per cent of all loaded trucks, are engaged in the direct distribution of consumption goods. Trucks destined to construction and repair jobs are also transporting goods to their final use. Trucks destined to farms are transporting commodities to their final use. Approximately 70 per cent of all loaded trucks are engaged in the direct distribution of goods to their final use. Food products and construction materials are the two principal types of commodities hauled by motor truck.

It is impossible to determine accurately the rate to be charged for haulage without a knowledge of the cost of performing the service. The intense competition and lack of stability in the field is illustrated by the fact that in the entire New England territory only three companies published tariffs and these were subject to change on short notice.

The transportation of goods by motor truck will continue to be largely the haulage of commodities by the owner-operator. There is, however, a distinct field for the commercial trucker.

There are two distinct types of distribution of commodities. (1) Distribution of goods having both origin and destination within the local area, such as the wholesale to retail movement, retail to consumer, distribution of building materials, and the delivery of milk, garden truck, fruits and vegetables from rural areas to the cities. (2) The completion by truck of the transportation service provided by rail and water facilities.

Organized motor truck service supplementing existing rail transportation provides for three types of service. (1) The extension of freight service by motor truck into areas without rail service. (2) Substitution of motor truck service for rail service on unprofitable branch rail lines. (3) Combination rail and truck service for short haul package freight in terminal areas and on congested truck lines. The development of this service is illustrated by the Pennsylvania and New York Central truck haulage of package freight. Prompt and rapid service and partial elimination of way-freight trains on heavy traffic sections is largely responsible for this development. The factor of increased safety of train operation by the partial elimination of the package freight train is a real operating advantage.

It must be remembered in discussing the growth of combined rail and truck transportation that its possibilities of growth are largely limited to the comparatively few

congested terminal areas and the heavy traffic railroad mileage.

The amount of motor truck tonnage in the long distance zones is comparatively small and decreasing in importance. The movement depends upon speed of service and consists of perishable goods, or goods requiring delivery at a specified time, and goods requiring special preparation for rail or water shipment, such as household goods.

The special fields for the development of motor truck transportation and its regulation are as follows: Local distribution of goods will continue to be the bulk of motor truck transportation and will be handled largely by the owner-operator, a small portion by the commercial trucker. Efficient distribution requires that accurate cost records be maintained by the owner-operator as well as by the commercial trucker. Distribution costs are important to the owner-operator. The merchant with an efficient distribution system has a distinct advantage in competition. Profitable business will be obtained by the commercial trucker knowing his service costs. The commercial trucker operating without a knowledge of the cost of doing business cannot determine unprofitable business and is usually a marginal or sub-marginal operator.

A more efficient use of terminal facilities requires close co-ordination of motor truck transportation with rail and water facilities. One well-organized motor trucking company, operating in co-operation with rail and water service in each terminal area and preferably controlled by the major rail carriers in the area, would probably be the most efficient operating organization. Ownership of the terminal motor trucking company is not essential, but control by the rail and water lines is essential to guarantee service and becomes imperative if through rates for combined rail, water and truck transportation are established.

As a major field for the development of motor truck transportation this movement is limited to large centers of population, primarily the terminal areas.

There is a real service to be performed by extension of motor truck lines into areas without rail facilities. The development of motor truck lines into undeveloped territory is perhaps the only means of transportation since it is becoming more difficult and hazardous to obtain capital for the extension of rail lines into new territory.

The substitution of motor truck service for rail service on unprofitable branch lines represents economy in providing transportation service as a whole.

The combination truck and rail service for short haul package freight on rail truck lines demands a close co-ordination of service. Haulage of rail package freight by motor trucking companies on a contractual basis represents the first step in this development. If this new type of service is economically sound the carrier ultimately should own and operate the motor truck equipment. Until this service demonstrates its place in the scheme of transportation it is reasonable for the rail lines to shift the risk of ownership of equipment and a large share of operating risks to the motor trucking companies.

The competition of motor trucking companies with rail lines is not economical, assuming that rail operation offers satisfactory service. The development of combined rail and truck service depends largely upon the legalization of through rates to include the motor truck pick-up and delivery service. The business requires well organized and stabilized trucking companies, and accurate cost records are essential in making fair rates.

Long haul transportation of commodities by motor truck is economically sound when peculiarities of the movement, such as speed of delivery, or factors of packing and crating, or special commodity movements are the cause of this movement. For the balance of the long haul move-

ment it is very questionable, assuming efficient rail service, (1) that the movement is economically sound and (2) that it is profitable to the motor trucking company specializing in the long haul field. Maintenance of cost records and a fair charge for the right to perform this service

will determine whether or not this movement is economically sound. Perhaps the principal value of the long haul trucker as a competitor or potential competitor has been to call the attention of rail managements to the shippers' need for rapid and efficient handling of package freight.

Secretary Jardine Denies Existence of Competition

W. M. Jardine, Secretary of Agriculture, in an address on "The Public and Highway Transportation," discussed the findings of the Department of Agriculture, which has the responsibility of administering the Federal Highway Act, in regard to the place of motor trucks in the transportation scheme. Mr. Jardine's paper follows in part:

There is no basis for the fear that the motor truck is going to compete seriously with the railroads. The facts we have found in all our surveys are sufficient to convince me. The truck has found its place in the short haul, and it is not taking over any business that the railroads can do as well or better.

In Connecticut we have found that nearly 40 per cent of the total tonnage is moved less than 10 miles and nearly 70 per cent less than 30 miles. The movement which runs to 100 miles and over is largely a movement of furniture and household goods in which promptness of delivery and a minimum of handling are the controlling elements. In that state we have found that two factors are, in general, responsible for the transportation of commodities by truck over 30 miles. The first is the lack of the rail service which would enable shippers to obtain rapid and dependable transportation of l.c.l. freight. The second is the one I have mentioned, that certain types of commodities, notably furniture, but including also groceries, meat and vegetables distributed from the cities to the smaller towns, are in their very nature adapted to motor truck shipment.

In California you find the same situation. The difference is one of degree only. There we find that 25 per cent of the total tonnage is hauled less than 10 miles and 60 per cent less than 30 miles; and the tonnage that is hauled more than 70 miles is less than 20 per cent. The reasons for the greater long distance movement are fairly clear. They are the greater distance between cities in California and the less complete service afforded by the railroads.

These are the facts in regard to the length of motor truck hauls in three typical areas in three widely separated sections of the United States. They are not armchair opinions. Our observers have gone out on the roads; they have stopped the trucks and asked the drivers where they were going and where they came from. We stand on these figures, and I think they prove very conclusively that the truck is not invading the long-haul field.

Long Truck Hauls Don't Pay

There was a time, no doubt, just after the war when enthusiasts thought they could see the truck taking the place of the railroad completely. But that time is past; and the reason for its passing is that the long haul doesn't pay, and truck operators know it doesn't. It has been tried; we seldom learn anything except by bitter experience. One of the most reputable haulage companies in the United States tried it, and kept a careful record of the costs, and the result is sufficiently discouraging. They operated a fleet of 35 trucks averaging 3½ tons capacity between Buffalo and Erie and between Erie and Cleveland. The distance is about a hundred miles in each case. They based their rates on the railroad tariff—a little more

for the low class commodities, a little less for the high class, but averaging fairly close to the railroad rates. And, on the basis of a year's operation, with \$200,000 gross revenue, their net loss was \$14,000.

The service trucks render is distinctly a service of distribution from centers. In the main it is a service which neither the railroads nor any other inflexible carrier limited to a fixed line of travel can render. It is a service which does not aim to move large bulk day after day and year after year between the same points. Its loads are picked up everywhere and hauled anywhere within the short-haul limit.

Mere percentages, however, do not make clear what has taken place in this 15-year period of changing transportation methods. Although the percentage of milk delivered to Chicago by rail has dropped from 94 to 68, the quantity delivered remains today almost exactly what it was in 1910; and although the railroads have lost to the motor truck a considerable part of the business within the short-haul zone of 50 miles, they have gone out beyond the normal trucking radius to develop the new producing territory which the growth of the city demands. There has been a considerable extension of milk mileage by railroads operating in territories where motor truck competition is especially keen.

From the standpoint of the producer the reasons which compel him to prefer the motor truck to the railroad within the short-haul zone are: that the motor truck gives a market outlet for milk produced in territories which formerly were too far removed from rail shipping points to be reached by wagon; the motor trucks pass the producers' gate and furnish a complete service that cannot be duplicated by the railroads; the driver of the truck is the producer's agent from the farm to the city dealer, and performs a marketing as well as a transportation service; shipment by truck reduces the number of handlings from half a dozen or more to only two; the farmer loses fewer cans; there is an estimated saving of five cents a hundred-weight on all milk trucked in by the elimination of the haul from the railroad milk platform to the city milk dealer; and last, within the short-haul limits the motor truck makes possible an actual saving in time of delivery from the farm to the city milk plant of an hour or more by the reduction in handling and the elimination of the hauls to and from the railroad at the two ends.

Nature of Truck's Service

The facts as we find them in our surveys will serve to indicate to you the nature of the service that is being rendered by the motor truck. Although they point to a transfer of business from the railroads to the highways, you will observe that in each case the business transferred is limited to a short-haul movement. Similar studies of the movement of non-perishable agricultural products, especially those which are shipped long distances in bulk, or the movement of the products of mines and forests, would reveal a different situation. Apparently the motor truck is finding its place very naturally. It has not yet shown an indication that it will ever function satisfactorily except on the short haul. But it is proving itself

a valuable supplement to the railroads in the local field, and in the vicinity of the terminals.

In the apparent success of experiment by the railroads I feel that we have a hopeful indication of the more complete and harmonious utilization of the facilities of both the highways and the railroads which will enlist the support of all agencies in each field in the near future. The public demands better transportation, which means not only a cheaper movement, but more reliable service and more prompt delivery. It is convinced, I believe, that the motor truck operating over the public highways can be utilized effectively, in proper co-ordination with the railroads, to accomplish these ends. The growing utilization of the new vehicle must necessarily result in a transfer to the highways of some of the business formerly handled by the railroads. How important such transfers may become, and what will be the effect upon the older carriers remains to be determined, but we should bear in mind always the thought that these older carriers shall not be crippled in the process. The services which they must continue to perform are vital to the economic well being of the country. In their proper field they can never be displaced by any form of highway transportation yet developed, and their services in that field must not be rendered unprofitable by unregulated and unwise competition.

In the field of passenger transportation the public has already given abundant evidence of its intention. There is no arguing the meaning of the fifteen million automobiles now operating on the fast improving roads. The people want the kind of individual transportation which these vehicles supply. Doubtless a part of this service would otherwise be furnished by the railroads. There is evidence, indeed, that the passenger movement on certain branch lines of railroads may be so reduced as to be no longer profitable. But, in the main, I think it must be conceded that the automobile is functioning in a transportation field of its own, and is gratifying wants which could not have been met by the railroads.

Salvaging Grain at Derailments and in Yards

By E. F. Ford

Freight Service Inspector, Chicago Burlington & Quincy,
Kansas City, Mo.

SALVAGING grain at a derailment, particularly when it is spilled down a high bank, is a problem that we found was generally attended by a considerable loss, regardless of whether we picked it up or sold it on the ground. If we picked it up and had it carried up the fill in tubs, and loaded into another car, the cost was often prohibitive, the cost of labor often running well towards the value of the grain thus reclaimed, especially on a single track portion of the railroad, and when a derrick car was necessary. The other alternative of selling it to a feeder on the ground was generally attended by an equal or greater loss. The average bidder at a derailment, figuring the awkward position the railroad was in, could buy the grain at his own price.

We finally went out of the selling business altogether at derailments, and cut the labor cost to practically nothing by maintaining a supply of 1,500 second-hand gunny sacks at division headquarters. These sacks were purchased at the smaller stations for from five to seven cents each, and more than paid for themselves when we reclaimed the first two cars of grain. We had these sacks stored in the

tool car of the derrick; but we soon found that the mice and rats played havoc with them and we had to swing them from the rafters on a platform in the freight house.

Whenever we have a derailment involving grain, the sacks and twine are forwarded with the derrick, and upon arrival at the scene they are dumped near the grain piles. The derrick outfit goes ahead with the usual reconstruction, picking up scrap, etc., and then when the outfit has to move into a station or siding, to let other trains pass, the men, instead of remaining idle, are put to work sacking up and tying the grain. When there are from 15 to 25 men engaged, as is usual, it takes but a few moves of the derrick, releasing the men for this work from twenty minutes to one hour for each move, until they have sacked up and tied a car load of grain. After it is all sacked and tied (without any cost for labor) it is a simple matter to have the way freight or any other train stop at the scene, spot an empty box car and have the sacked grain loaded into it, thus avoiding the expense of a work train.

After reclaiming the grain it used to be our practice to forward it to one of the large grain markets, have it cleaned in a terminal elevator and sold on the market. An experience however at one of these derailments changed our policy in this feature. This particular derailment involved a carload of wheat, and it happened to be spilled on level ground. We scooped this into an empty car on a siding. When the scoopers reached the cinders they were stopped and we let the car go forward to be cleaned at a terminal elevator and sold; or forwarded on original billing, depending on how clean it turned out. As it developed it did not prove good enough for flour and it was sold for feed. The portion still remaining on the ground being too badly mixed with cinders was swept up, cinders and all, and sacked; it was then forwarded to a county-seat town of about 7,000 people, located in the midst of a large feeder territory; and this lot, amounting to slightly over 100 bushels, actually sold for feed at an advance of 25 cents a bushel over the carload of clean wheat which was sold in the large city.

The agent at the county-seat town thus established his station as a local grain market, and the feeders in surrounding country are glad to pay close to market value for what he has to sell.

This agent's selling methods are of interest. We found that he was a believer in re-conditioning the grain before offering it for sale, and his small warehouse force did the re-conditioning by hand, using a home-made hand sieve to clean it with. The agent explained that it was worth the trouble, since the grain, after it had been cleaned, would bring 25 to 50 cents a bushel more than the same grain would bring when sold cinders and all.

This primitive method of cleaning grain being very slow and a great time killer, the only fair thing to do was to provide this agent with a machine to do this work. This was done, by purchasing for him a grain cleaning fan mill at a cost of \$46; this fan mill cleans dirty grain at the rate of 60 to 90 bushels an hour, is hand operated and requires two men to operate it.

We kept careful check on this agent's sales after giving him this fan mill, and find he averages 97.5 per cent of market value, for grain for which we formerly were fortunate to get 65 per cent of market value.

There is really no good reason for any considerable loss from spilled grain. The first thing to do is to recover it and this can be done with the burlap sacks easier than by any other method; then after the scoopers have reached the cinders have them sweep it up, cinders and all, and run this through a fan mill. Your grain is then in shape to sell; and the place to sell it is any county-seat town of 7,000 to 10,000 people, located in a feeder belt.

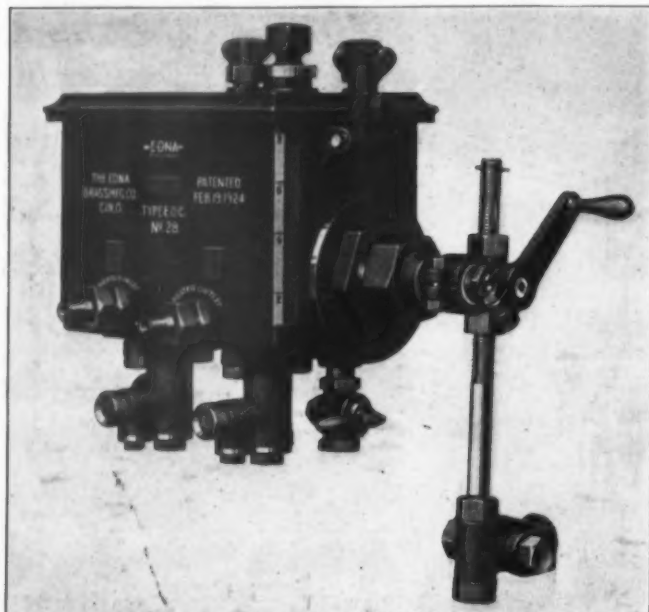


NEW AND IMPROVED DEVICES FOR LOCOMOTIVES AND CARS

Locomotive Force Feed Lubricator

A FORCED feed lubricator designed to meet railroad requirements has been placed on the market by the Edna Brass Manufacturing Company, Cincinnati, Ohio. It is made in five different sizes of two, three, four, five and six feeds with oil capacities of 8, 9, 10, 11 and 12 pints, respectively.

The body is equipped with sight glasses, one in each end, and a gage rod through the cover. Pint marks are



Force Feed Lubricator Designed to Prevent Water from Leaking Back to the Lubricator

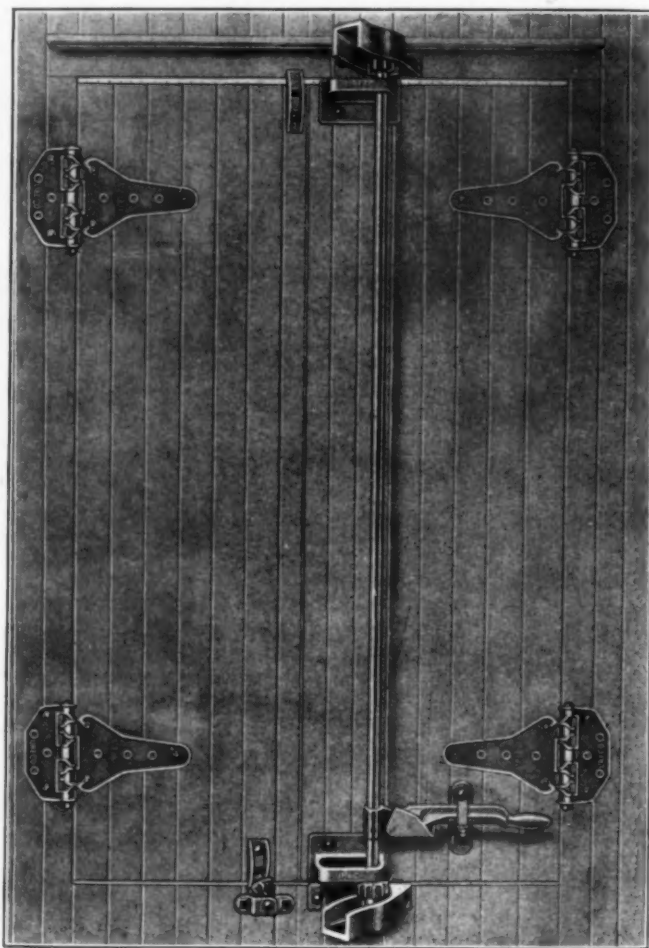
stamped on the body. The lid is hinged. The lubricator can be used either right or left hand and to make the change requires only the reversing of the drive shaft and the lid. The drive is a fifty-tooth hardened steel ratchet and three pawls. The reverse ratchet is steel and is operated both by power from the locomotive and by hand. The forcing units consist of a hollow plunger and cylinder of steel, with brass and other metals suitable for their performance. The parts are immersed in oil at all times and require no attention. The discharge is made through the unit holder, equipped with two steel ball checks. The line check seat is steel hardened and ground. A second or intermediate ball check is used as added precaution against water leaking back to the lubricator.

In installing the lubricator, a suitable bracket $\frac{3}{4}$ in. thick should be provided with a length equal to that of the lubricator body and secured to a rigid part of the locomotive, preferably to studs in the back valve chamber head. Should conditions prevent, it can be placed elsewhere, but if it is not absolutely rigid, broken pipes may result. After the bracket and lubricator are set so as to bring the operating lever in line with the point from which the drive is to be secured, the link end connection may also be secured. The terminal valves are provided with $\frac{1}{2}$ -in. standard pipe threads; these should be attached to tallow studs and can be set in any position. The terminal valves should be put in as cool a place as possible. When making connections to the cylinder, they should not be placed between the valve chamber wall and the cylinder wall, but outside of the jacket. Otherwise, high superheat results in heating up all the parts and affects the springs in the terminal

valves, causing them to weaken and not hold the set pressure. The bodies of all the lubricators are equipped with heaters for a $\frac{3}{8}$ -in. steam pipe connection in which either live or exhaust steam can be used. If exhaust steam is used, it should be taken from the air pump exhaust. Precaution in piping must be taken to avoid water traps in order to prevent freezing in cold weather. The terminal valves are set at 225 lb. pressure at the factory. This is sufficient in all cases where boiler pressure is lower than 210 lb; if a higher boiler pressure is carried, it will require the resetting of terminal valves to about 15 lb. higher than the boiler pressure.

Refrigerator Car Door Operating Device

A N improved design of refrigerator car door operating device has been developed by the Union Railway Equipment Company, Chicago. Many refrigerator doors have been badly damaged by the use of crowbars and other tools used in opening and closing the doors. The operat-



Car Door Operating Handle Located so that it Can Be Operated Either from the Ground or from Loading Platforms

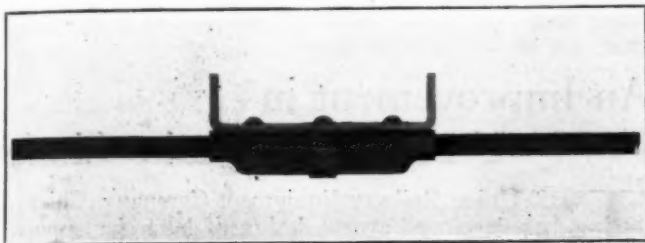
ing device shown in the illustration provides a means of opening and closing the doors with ease, and will eliminate the use of tools, thereby avoiding many expensive repairs. The operating handle is located on the door so it can be conveniently operated from either a standing position on the ground or from loading platforms. This

arrangement provides a greatly increased leverage which minimizes the energy necessary to open or close the doors. This device can also be conveniently applied to cars already in service when renewal of doors or operating fixtures is necessary, as well as on new equipment.

The illustration also includes the Ureco self-locking refrigerator door hinge recently placed on the market which eliminates the use of hooks and eyes for holding the doors in an open position. This device is said to comply fully with requirements of Rule 3, Section J. of the interchange rules.

Auxiliary Brake Beam Support

A SIMPLE, strong, safe and economical auxiliary brake beam support attached to car trucks has recently been placed on the market by the Buffalo Brake Beam Company, New York. The parts are made of forged steel, are interchangeable in every respect and

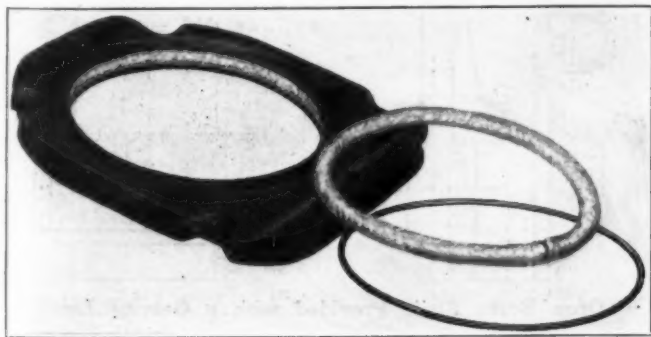


Buffalo Brake Beam Support Interchangeable and Applicable to All Types of Trucks

are applicable to all types of trucks. The device is provided with three safety features both at the center locking point as well as at each end of the support. It can be economically applied and becomes a permanent fixture on the truck.

Journal Box Dust Guard

A JOURNAL box dust guard manufactured in all sizes for freight and passenger equipment to conform to the American Railway Association standards has recently been placed on the market by the Union Asbestos & Rubber Company, Chicago. The purpose of the design is to maintain an oil-retaining and dust-proof joint around the axle and side of the dust guard chamber.



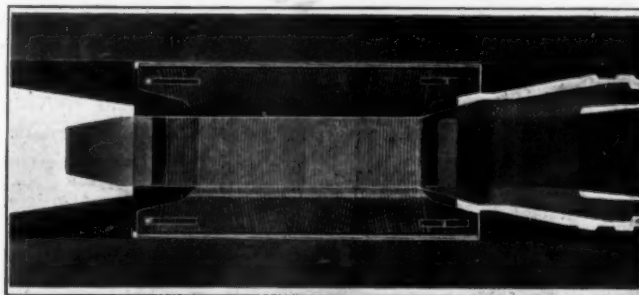
Dust Guard Pressed from Steel Sheets—An Asbestos Packing Ring Is Used

Its construction differs somewhat from the usual design of dust guards. The two sides of the guard are pressed from steel sheets and securely spot welded to-

gether at four points. One side plate of the guard is so formed as to act as a spring and forces the opposite side tightly against the oil and packing retaining wall of the journal box. This arrangement provides a dust-proof joint between the dust guard and the side of the dust guard chamber and makes it self-supporting in the box, eliminating continuous and uneven wear at the top of the bore of the guard, as is the case where it rides on the axle. A special asbestos packing ring, inserted in the groove formed in the guard, is automatically held in close contact with the axle at all points on its circumference by means of a circular steel spring.

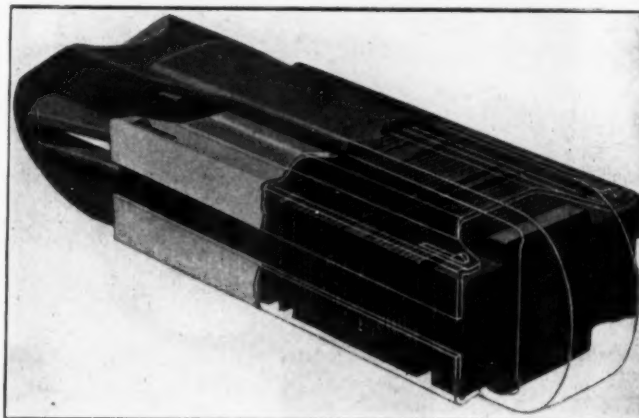
Improved Draft Gears for Freight Cars

THE illustrations show an enclosed type of draft gear made for capacities of 200,000 to 1,000,000 lb. and in standard sizes to fit 18½ in. and 24½ in. pockets, and in special sizes to suit special conditions. There are over 4,000 sq. in. of frictional surfaces in ad-



The Waugh Draft Gear Under Full Compression

dition to the spring capacity on a Standard 29½-in. draft gear. Its capacity is controlled by increasing or decreasing the number of plates in each group. This flexibility of design enables a railroad, if desired, to transfer the



Phantom View, Showing the Construction of the Waugh Enclosed Draft Gear

gear from one car to another and arrange the groups of plates to meet the capacity of the car.

In construction, the draft gear consists of straight spring plates, end followers with convex curved faces, spring end separators with concave curved faces and a convex center separator. The spring plates are oil tempered and the followers and separators are drop forgings and malleable castings.

In operation the groups of spring plates are deflected over the curved faces of the followers and separators which limit the deflection and protect the plates against injury from over solid blows.

The deflection of these plates from their normal straight form is attended by an increasing frictional adhesion of the surfaces, which adds to their cushion capacity and retards the recoil upon the return of the gear to normal position. When fully compressed, the plates in each group take a bearing over their entire area.

As the standard height of the spring plates and operating parts is 6 in., a bottom guide casting and a top guide pressing are used to retain the gear in approximately the vertical center of the standard $9\frac{1}{4}$ in. pocket and yoke. These guides also retain the gear in alinement regardless of variation in sill spacing. This draft gear is manufactured by the Waugh Equipment Company, Chicago.

A Decarbonizer for Locomotives

THE purpose of the Ehrhart decarbonizer manufactured by the Pilot Packing Company, Chicago, is to introduce a driving journal compound into the valve chest, to prevent an accumulation of carbon in the exhaust passages and eliminate existing carbon deposits.

It is simple in construction as there are no moving



A Cylinder Grease Lubricator Which has No Moving Parts

parts or wearing surfaces. No changes or adjustments are needed as the size of the hole in the choke is standard. It is mounted directly on the main valve chest. The tapped holes now used by relief valves may be used if available or it may be connected to the stud at the oil pipe connection, by making the stud sufficiently heavy to support it,

and bracing it from the smoke box. All connections should be steam-tight.

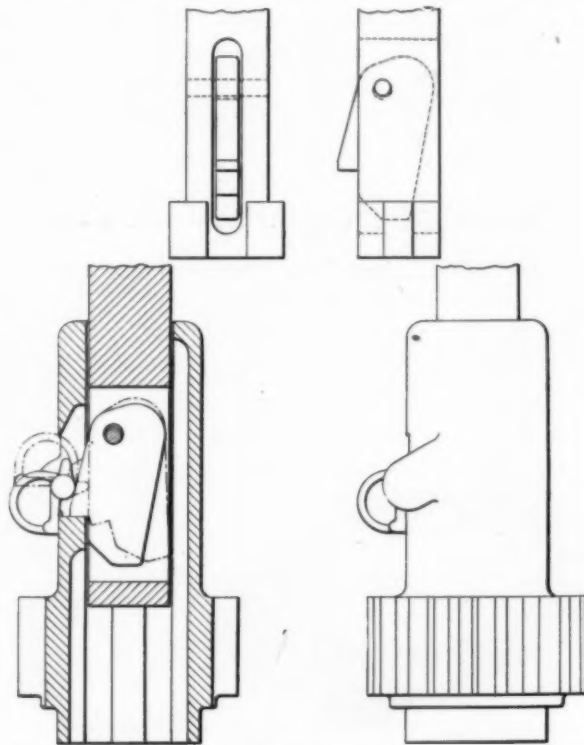
When in operation steam enters the body of the decarbonizer from the bottom through the small opening in the choke plugs, percolates through the grease which mixes with the steam and, with each movement of the main valve, a measured quantity of grease is drawn into the valve chamber, the quantity being controlled by the standard size opening in the choke plug. This, in connection with the hydrostatic lubricator, insures thorough lubrication of all surfaces within the valve chest and cylinder, under all conditions.

There are no valves between the decarbonizer and the steam chest. It is filled with new or reclaimed driving journal compound, the filling plug tightly secured and it is ready for operation. It requires no attention from the engine crew other than to know that it is filled regularly, as it works automatically and positively.

To fill the decarbonizer, the drain valve on the side of the decarbonizer is opened to remove any possible accumulation of steam, and then it is filled with grease and the drain valve closed.

An Improvement in Ureco Drop Brake Shafts

THE Union Railway Equipment Company, Chicago, has developed a new design of latch for supporting and releasing the drop brake shaft for flat cars and drop end gondolas. In the past a design which included a trigger arrangement in the sleeve or brake



Drop Brake Shaft Provided with a Gravity Latch

drum has been used, while the new device is designed with a gravity latch incorporated in the brake shaft itself, which acts to engage an opening in the drum. The new design is found to be more accurate and positive, as well as safer in operation than the design previously used. The accompanying illustration shows its construction.

Huntoon Brake Beam Guide and Safety Hanger

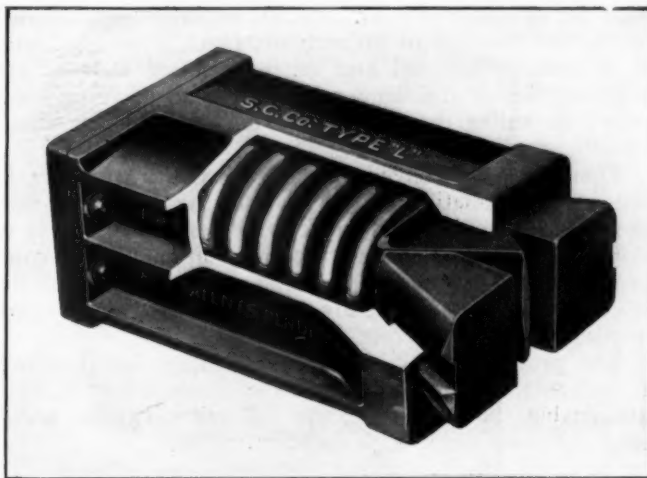
A BRAKE beam guide and support combining the advantages of simplicity, strength and superior guiding action has been introduced by The Bradford Corporation, New York. As shown in the drawing, this device consists of a guide casting riveted to the spring plank and an arm passing through the casting and bolted to the compression member of the brake beam with a bent clamp. Two of the guides are applied on each brake beam at any convenient location near the ends of the beams. The guide arm is smaller than the slot in the casting and normally is in contact only on its upper surface. The angle of the arm and the slot is such that the brake shoe is held in proper alinement to insure even wear. Correct guiding action is afforded over the entire range of travel that may occur with the maximum variation in the diameter of the wheels and the thickness of brake shoes.

Because of the location and the construction of this guide, there is very little interference in case it is necessary to remove or replace brake beams. When the clamp bolt is removed the guide arm can be slipped through the guide casting far enough to permit the brake beam to pass the projecting end.

One of the special features of this guide and support is the fact that it functions the same whether the frictional force applied to the brake shoe is upward or downward, and, therefore, will prevent brake beams from climbing the wheel as well as keep them from dropping. The point at which the guiding effect is exerted is a considerable distance from the hanger hole in the brake shoe and because of this condition, slight variations in the relative location of the members or the lengths of the hangers will not have any appreciable effect on the alinement of the brake shoe with respect to the wheel. The guide arm

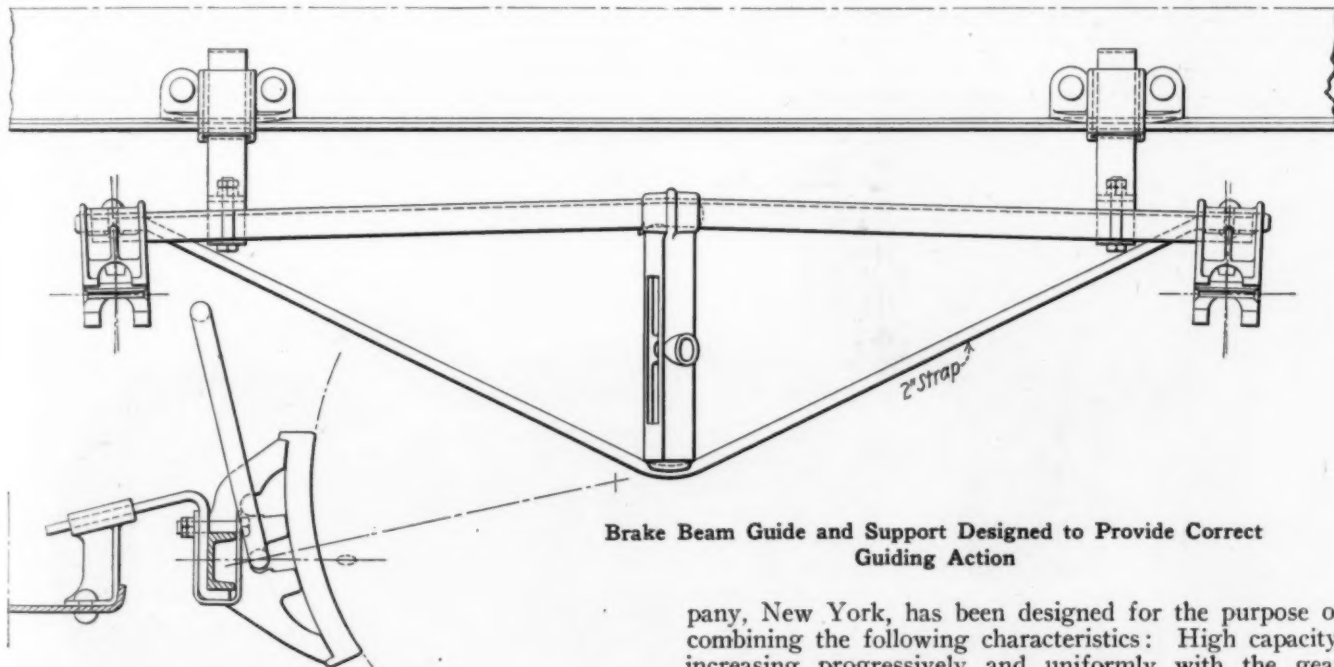
Sessions-Standard New Type L Draft Gear

TWO fundamental conditions have vitally affected the efficiency in service of all draft gears. On the one hand there has been the continued trend toward the use of larger and heavier cars, more powerful locomotives and longer trains. On the other hand there



The Sessions-Standard Draft Gear Designed to Give a Substantial Initial Compression and High Absorption of Energy

is the continued inflexibility of standard overall dimensions within which, for purposes of interchangeability, the draft gear is required to fit and function. Accepting these conditions as the most desirable ground work on which to build, the Sessions-Standard Type L friction draft gear manufactured by the Standard Coupler Com-



Brake Beam Guide and Support Designed to Provide Correct Guiding Action

and guide casting are amply strong to withstand forces to which they are subjected in case the hanger fails to support the beam. Tests have been conducted in which the brake beam was supported entirely by the safety hanger, all parts functioning properly under this condition.

pany, New York, has been designed for the purpose of combining the following characteristics: High capacity, increasing progressively and uniformly with the gear travel; ample recoil; sturdiness and oversolid strength; 2½-in. travel, all friction; substantial initial compression, both spring and friction; only five parts; electric steel housing.

Using a tup of 9,000 lb. falling 2 ft. ½ in., an average capacity of 18,375 ft. lb. is obtained. The average absorption of energy is approximately 75 per cent. Thus,

the recoil is ample to insure a positive and prompt restoration of the friction elements to the working position and, correspondingly, to insure against sticking. The abundance of column strength provides not only for the protection of the gear itself but also against the more serious danger of damage to the draft and end sills and to the gear attachments.

The $2\frac{1}{2}$ -in. of travel is all friction and the gear capacity is progressively uniform up to the closing point. Hence, the frequently encountered situation of an ostensibly high performance in gear capacity, actually accomplished in the last fraction of an inch of travel, is avoided and, as a consequence, sill and other structural stresses are kept well below the danger limits instead of being compelled to suffer the bad effects of an inefficient shock absorbing mechanism.

There is no inconvenience or possibility of error in regard to installation of the gear on the car. Although the gear has high initial capacity, it has been possible to arrange the design so that there is additional initial compression quite sufficient in amount to exclude the laborious exertions usually attendant on draft gear application.

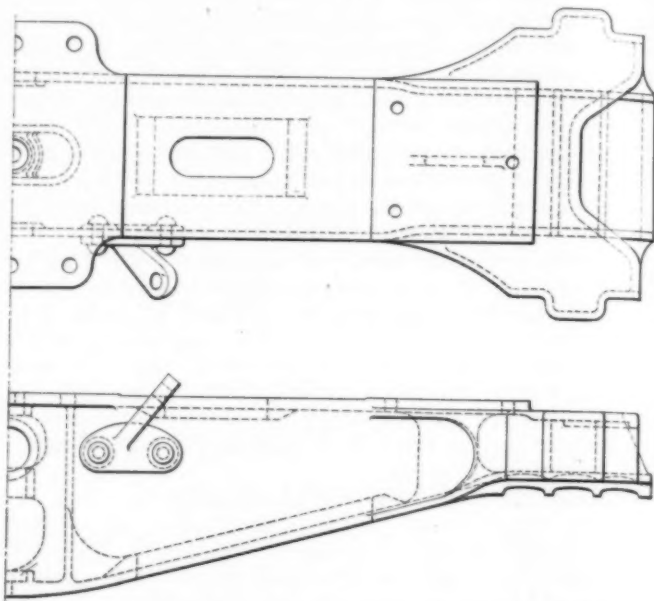
The provision of initial spring compression definitely retards to the maximum degree the accumulation of slack and enables the user to secure full friction travel and a long continuation of high capacity rating.

Recent Developments of the Dalman-Chiles Truck

THERE appears on page 1489 of the June 13, 1924, issue of the *Railway Age* a description of the Chiles truck for freight cars. In the design of this truck, the object is to provide increased spring capacity without disturbing the relation between capacity and resilience and without additional truck weight. This increase has been secured by the use of a greater number of the present standard A. R. A. Class "D" coils. The introduction of additional springs necessitated a new design of truck side frame and a new bolster end design to provide greater spring bearing area.

The basic principle of the Chiles type of side frames is the use of the form assumed by a flexible cord or chain

supported only at the ends and loaded with known weights, distributed as they would be when carrying the weight of the loaded car. The outline of this freely supported flexible member gives the load adjustment which offers the maximum resistance per unit of weight. The ends of the truck bolster were made considerably broader so as to provide for the use of four double Class

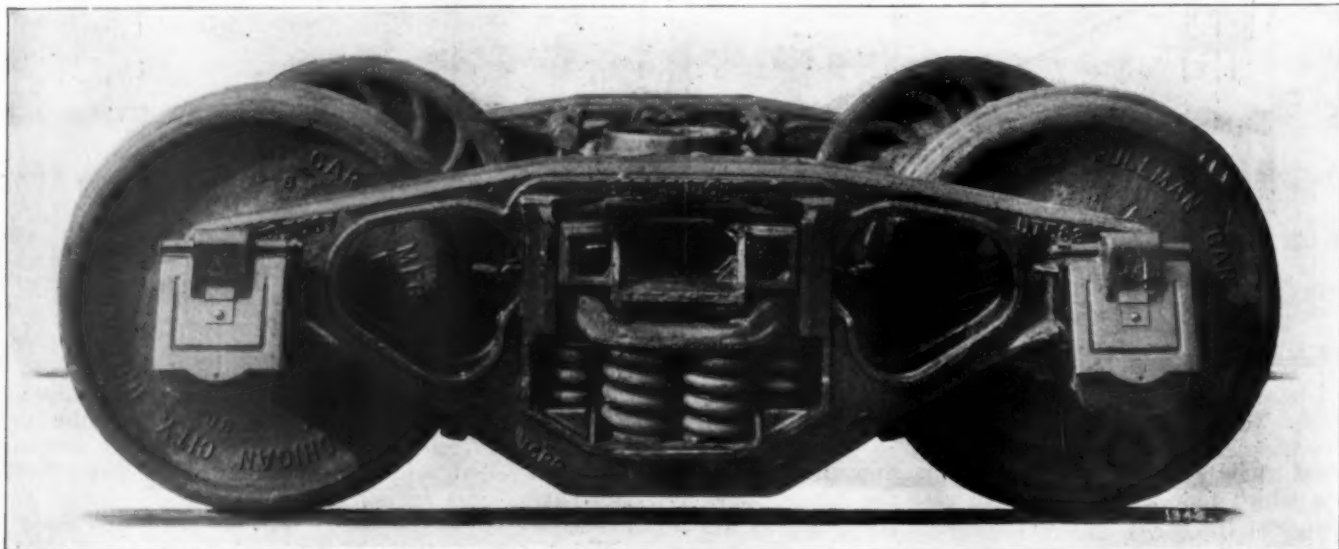


Dalman-Chiles Cast Steel Truck Bolster—Designed for Barber Lateral Motion Rollers

"D" springs in the central group with single outer "D" bars in the elevated end springs.

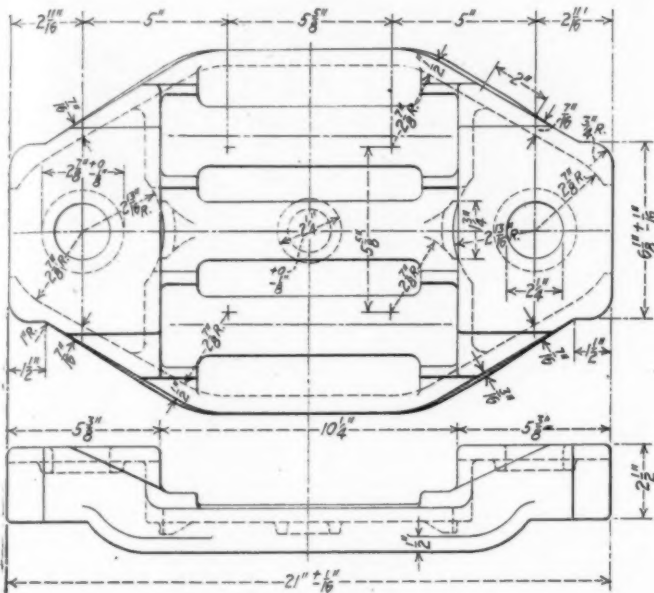
The truck shown in one of the illustrations differs from the one previously described in that it has been provided with lateral roller motion devices. There are three standard 10-in. rollers between each cap and the end of the bolster.

The drawings of the bolster and the truck seat cap are shown, from which it will be noted that the truck is not only held in square position by the two bosses on the bottom of each spring plank end, but that the flanges also engage the curved upwardly extending walls of the side



Dalman-Chiles Truck Designed for Cars of 50-Ton Capacity Showing the Arrangement of the Springs and Lateral Motion Device

frame which insures that the truck will remain square. Considerable trouble has been experienced in the past, due to wear between the contact surfaces of the truck bolster and the bolster opening face of the side frame columns. It was felt that increasing the spring resilience would aid in reducing this difficulty. The springs are



Roller Seat Spring Cap for Barber Lateral Motion Device

spaced more widely with reference to the center line of the truck bolster, and because of their increased number, tend to hold the bolster free from the side frame columns and still further reduce wear.

The Chiles truck is manufactured by the Dalman-Chiles Company, Chicago.

Insulation for Refrigerator Cars

A SOMEWHAT unusual development has taken place in the field of refrigerator car insulation, with the advent of what is known as Dry Zero, manufactured by Johns-Manville, New York. This product is the result of intensive study and research work in the theory of heat transmission, in the effort to produce a light and efficient insulation particularly suited for refrigerator cars, where weight is a matter of prime importance.

In arriving at this new product, it was the aim of the manufacturer to find a material in which could be combined to the greatest possible extent, the following essential qualities which are desired by all refrigerator car operators.

The qualities are: the highest possible insulation value; light weight insulant; low moisture absorption; immunity from effects of impact, vibration and torsion; simple and inexpensive application; non-interference with and possible simplification of standard frame construction, and permanence of the insulant and its qualities.

It is claimed that these seven features have been included in the new insulating material. According to tests made by the Bureau of Standards and the Armour Institute of Chicago, Dry Zero insulation has a thermal conductivity of 5.66 B.t.u. per sq. ft. The 2-in. blanket which is principally used for refrigerator car insulation weighs less than 6 oz. a sq. ft. and has a density of 1.57 lb. a cu. ft. It is made up in any size in convenient blanket form,

having longitudinal seams spaced 6 in. apart. It can also be used in bulk form—though in this form, it is not so easy to handle. It is claimed further that refrigerator cars insulated with Dry Zero insulation have shown a dead-weight saving ranging from 1,000 to 3,000 lb. on each car.

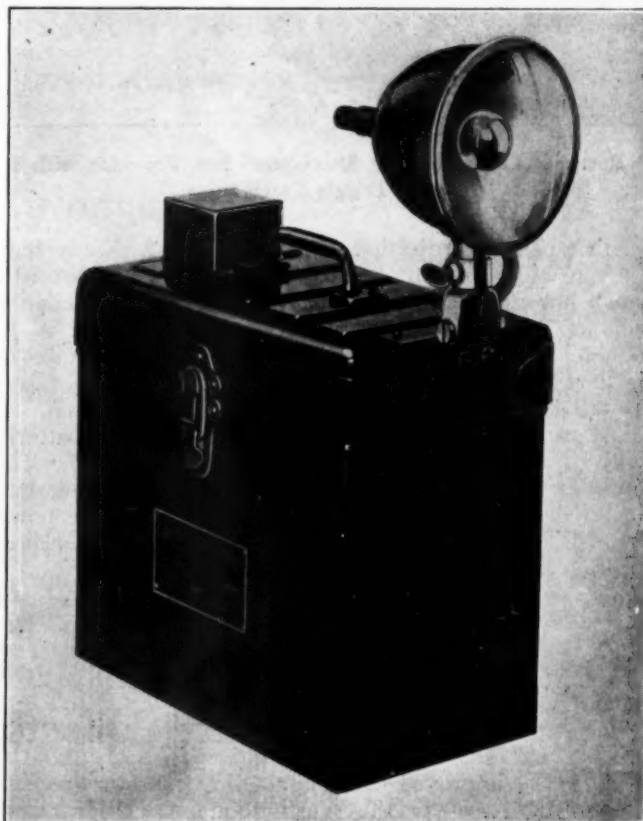
Dry Zero is a processed vegetable fibre which is hollow in structure, but the ends of each fibre are closed forming a myriad of natural combined air cells. It possesses the peculiar characteristic of being naturally moisture repellent, and also has considerable natural resilience, an inherent quality of the fibre, which counteracts any tendency to settle in a wall. The effects of impact, vibration and torsion are negligible.

On account of its light weight, it can be applied to standard car construction in one course and in one piece extending from the door frame on one side to the door frame on the other side, at the same time effectively insulating the corner posts as well as the other frame members.

Railway Portable Lighting Outfit for Inspection Cars

A PORTABLE lighting outfit has been designed to meet several needs but particularly for use as a head light and extension inspection lamp for motor driven or hand propelled inspection cars used on railroads by signal maintenance departments.

It consists of a substantial sheet-steel box furnished



A Swivel Mounting is Provided for Swinging the Lamp in Any Direction

with two coats of baked on black japan, equipped with a comfortable carrying handle, strong hinges and toggle

catch. Upon one end of the cover is mounted an automobile type spot lamp which has a heavy housing containing 12 ft. of extension wire cord automatically wound on a spring reel, a highly polished parabolic reflector and a standard 6-8 volt 21 candle power bulb, rated at a terminal current of 2.81 amp. A swivel mounting provides for swinging the lamp in any direction without turning the box and also allows for disconnecting the lamp from the box for carrying it in the hand for inspection purposes within a radius of 12 ft. from the box.

The lamp housing includes a switch for turning the light on and off and also means for focusing the bulb



Batteries Contained in a Sheet-Steel Box Provided with a Toggle Catch

so that perfect projection can be attained with any bulb. On the other end of the cover of the box is mounted a small housing which contains a standard S. A. E. double contact socket in which is placed a standard S. A. E. double contact plug which may be used for connecting in a red tail lamp circuit or an igniting circuit, or both as tail lamps are generally provided with a switch.

At varying prices three different capacities of batteries with or without non-spill valves may be furnished. This outfit is regularly supplied with a 21 candle power bulb but if desired it may be supplied with a 12 candle power bulb. The equipment is manufactured by the Edison Storage Battery Company, Orange, N. J.

Westinghouse Centrifugal Dirt Collector

THE improved centrifugal dirt collector recently developed by the Westinghouse Air Brake Company, Wilmerding, Pa., will contribute to economy and better maintenance of brake equipment. This is due to the generous size of the chamber in which the dirt is deposited, its large capacity making it possible to accommodate all the dirt entering between cleaning periods. Moreover, cleaning is easily accomplished, it

being necessary to remove but two bolts and drop the reservoir.

Another feature of the design is that obtained by the brass umbrella-shaped valve which floats on a stem in



Centrifugal Dirt Collector Containing a Large Dirt Chamber and Valve to Prevent Blow-Back

the lower chamber. Consequently, during charging of the equipment the swirling air currents impart a rocking motion to the valve which in turn deflects dirt particles into the chamber. The rapid reduction of the air pressure above the valve causes it to lift and seal on the seat, thereby isolating the dirt chamber so that no dirt can re-enter the brake system after once being collected. It is supplied both with and without drain cocks.

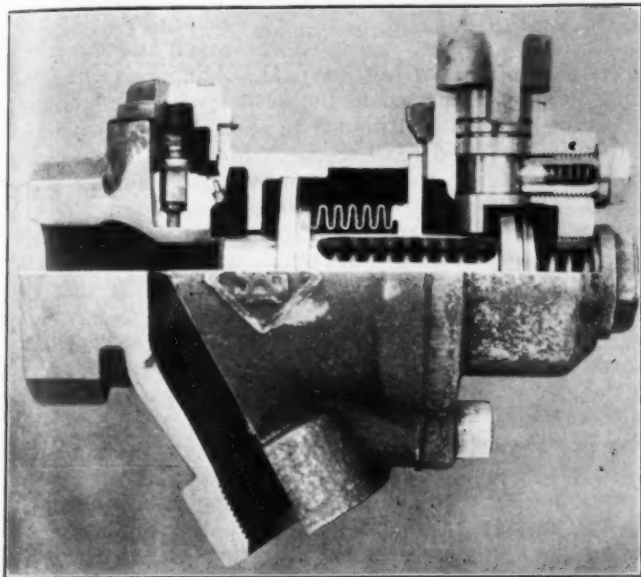
Non-Closable Angle Cock

IN order to eliminate the potential danger of serious accidents due to the loss of braking power caused by accidental or malicious closing of angle cocks and yet maintain the present flexibility of the air brake system, a semi-automatic angle cock incorporating new principles has been designed by engineers and associates of the Sprague Safety Control & Signal Corporation, New York. This valve is so constructed that it will automatically maintain an open brake-pipe passage so long as the hose couplings between the cars are connected, irrespective of any accidental or malicious movement of the handle, and will also operate to close this passage automatically when the cars are uncoupled, provided that the operating handle has been placed in the "off" position. It is interchangeable with the present cone valve and is manipulated in precisely the same manner. It may be mixed indiscriminately with older equipment and no changes in procedure will be required in making up train or switching cars.

In the illustration showing the valve in the closed position, it will be seen that the mechanism consists of a cylinder casting threaded at the left hand end for attachment to the brake pipe and at the lower point for attachment of

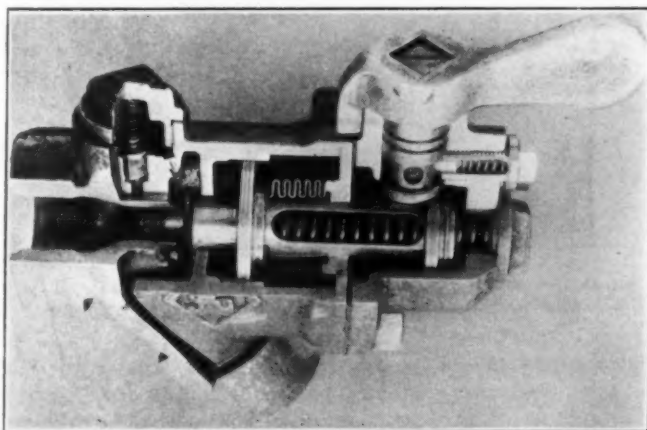
the flexible hose coupling. The interior of the casting is divided by an interval baffle plate with a central aperture through which projects an axial extension of the main piston; the face of the axial extension is provided with a rubber valve seat which registers with a bronze valve bushing on the end of the Venturi reduction in the air passage.

When in the "off" position with the hose coupling disconnected, flow of air past this valve seat is prevented by



View Showing the Angle Cock in Closed Position

the pressure of the helical seating spring, shown in the sectionalized axial spring guide on the right of the piston. Brazed to the right side of the piston and to the left side of a holding guide plate is a syphon or flexible metallic bellows. The operation of this bellows is similar to that



The Angle Cock in the Open Position

of a flexible diaphragm except that on account of its form a much longer stroke is permissible.

With the locomotive coupled to a train and all the hose connections made, the valve handles are turned to the position parallel to the line of the brake pipe in which they are automatically maintained by means of a ball lock. During this movement of the angle cock handle, the valve and operating piston are lifted by the opening cam against the thrust of the seating spring, and as a consequence, brake pipe air flows through the system. The handles of the rear and of the pilot angle cocks of the brake pipe are as at present left in the closed position.

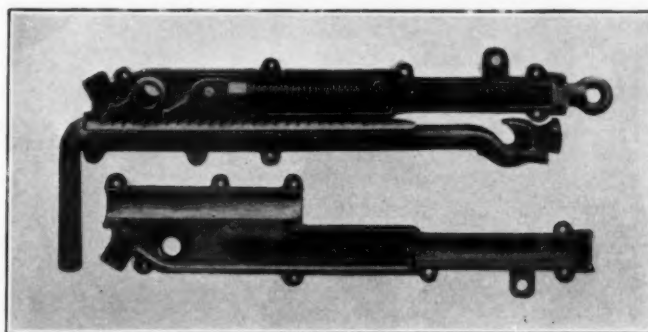
Once the spring-pressed valve is lifted from its seat by means of the opening cam, brake pipe air will flow through the hose connections. This pressure will act on the face of the piston and force the valve to the extreme open position. This pressure will also gradually equalize by the piston and fill the annular space on the outside of the syphon bellows, but the entire interior of the syphon is maintained at atmospheric pressure. As a result an unbalanced force of sufficient moment is created by the differential air pressures to overcome the thrust of the seating spring. The piston valve will thus remain in the open or right-hand position so long as the hose couplings are made and any appreciable air remains in the system. If the angle cock handle should be moved to the "off" position accidentally or maliciously, it can not affect the piston valve as the cam is single acting toward the "on" position. Full service and emergency brake applications may be made at will through any number of angle cocks of this character with the handle in the "off" or "closed" position.

When uncoupling cars all that is necessary is to place the handles of both angle cocks in "closed" or "off" position and part the hose. Pressure in the hose will reduce practically instantaneously to atmosphere; the slight amount of air coming through the Venturi reduction strikes the baffle plate and, owing to its peculiar form, reduces the pressure between the baffle plate and the piston to or below atmospheric by means of an ejector action. The pressure momentarily trapped in the annular space to the right of the piston and the exterior of the syphon acts as a powerful momentarily supplement to the spring, and forces the valve to its seat. The action just described is so rapid that the brake pipe air loss is hardly perceptible on a pressure gauge. Once the valve has been seated, after parting of the hose, it is maintained in the closed position by the helical spring.

This semi-automatic angle cock will operate without adjustment over all ranges of brake pipe pressure from 70 lb. to 110 lb. and consequently, it is equally suitable for freight or for passenger service.

Automatic Slack Adjuster for Freight Cars

WHILE the air brake today is one of the most highly developed and efficient devices used on freight cars, every part from the brake shoes to the brake cylinders must be in accurate adjustment for

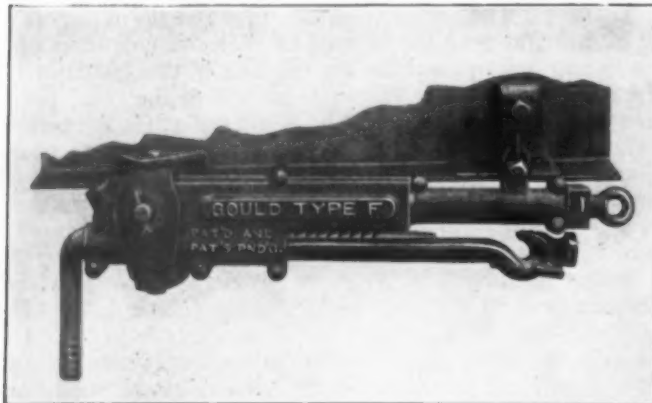


The Contained Parts of the Gould Automatic Brake Slack Adjuster

smooth and efficient braking of the long trains in use today. Varying slack on the different cars in the train caused by wear of brake shoes and wheels and the pins

and holes in the brake rigging result in different piston travel and irregular braking action throughout the train. This irregular braking action is the principal cause of break-in-tuos and damage to cars and lading caused by rough handling.

Some success has attended efforts to develop an automatic slack adjuster or take-up for passenger equipment but the problem of developing a similar device for freight cars has presented more difficulty because of the limitation



A Slack Adjuster for Freight Cars which Takes the Place of Usual Dead Lever Stop

of cost and the necessity for accessibility without interference with other parts.

The Gould Coupler Company, New York, has spent a number of years in the development of a simple and efficient device for freight equipment and The Symington Company, Rochester, N. Y., now presents the result of this study and development in the Type F freight slack adjuster.

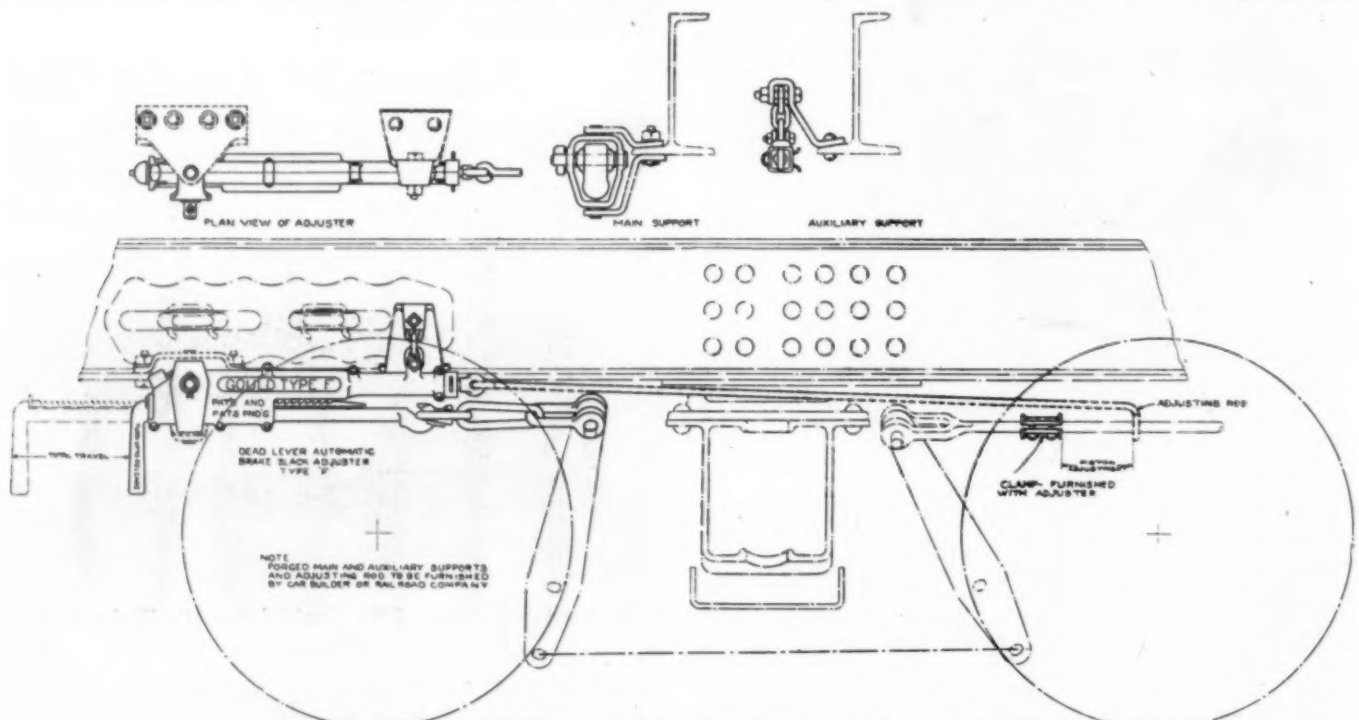
This adjuster automatically takes up wear in shoes, wheels, pins, etc., keeping the piston travel within approximately $\frac{1}{2}$ in. of normal from the application of new shoes until they are worn out. When replacement of one or more shoes is necessary, the adjuster may be manually

set back for this purpose, and upon the next application of the air, the device is automatically brought into proper adjustment. It is not necessary for the maintenance gang to make any calculations to determine the correct setting of the device as it is not possible to set it improperly.

This adjuster takes the place of the usual dead lever stop. It is attached to the bottom flange of one center sill by two forged brackets designed to allow the necessary flexibility so that the adjuster will accommodate itself to all normal movement of the dead lever on straight and curved track.

The adjuster consists of a malleable iron housing which serves as a guide for a cylindrical holding rod, the latter being flexibly connected to the dead lever. This holding rod is itself held in position by a sliding rack strip which in turn is held by a pawl or dog. Mounted in the casing above the holding rod is an adjusting rod having a dog or pawl also engaging the holding rod rack strip and held in its normal position by the spring which encircles the adjusting rod. Attached to the eye at the rear of the adjusting rod is a connection which passes under the body bolster and is slidably attached to the top connection or pull rod of the brake rigging just beyond the live lever. An adjustable stop clamped to the top connection or pull rod actuates the adjusting rod as soon as any wear has developed or as soon as the cylinder push rod moves more than the predetermined amount. Assuming wear to have taken place, an application of the brakes moves the adjusting rod so that the movable pawl picks up one tooth on the holding rod rack strip. On the release of the brakes the spring returns the adjusting rod to its normal position carrying the holding rod with it and the holding rod is maintained in its new position by its engaging pawl. This operation is repeated as soon as additional wear amounts to the equivalent of one tooth space on the ratchet. In effect, the device is a dead lever stop with a large number of adjusting holes which automatically changes the position of the dead lever pin until the shoes are worn out.

When it becomes necessary to replace one or more shoes, the device is set back to normal by giving the drop handle a quarter turn, which releases both pawls and

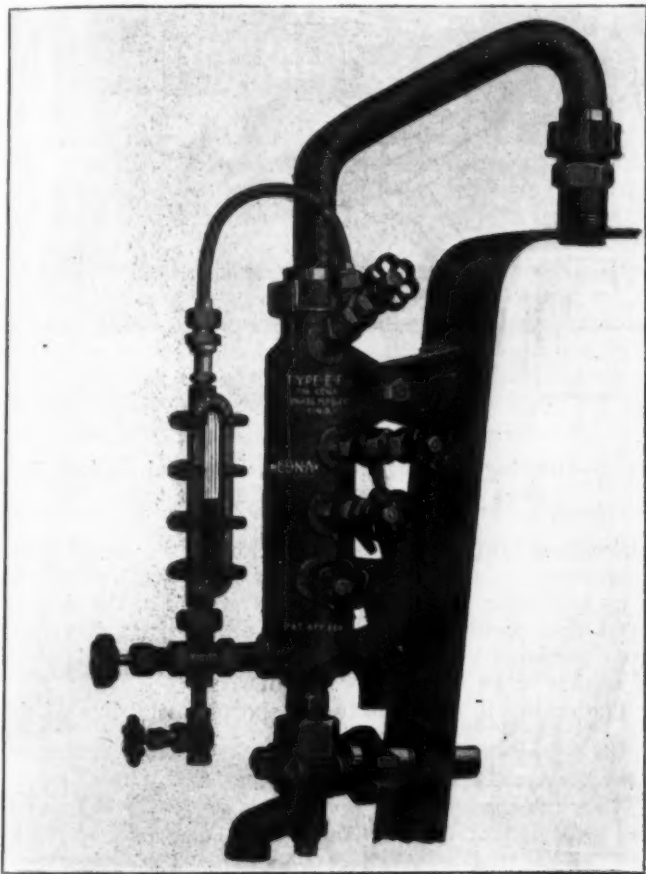


An Application of the Gould Slack Adjuster to a Side Sill

allows the holding rod to return to the starting point. If through inadvertence the operator should fail to move the handle back to its original position, the first brake application will automatically do so.

Water Column for Locomotives

THE Type EF water column shown in the illustration, which is manufactured by the Edna Brass Manufacturing Company, Cincinnati, Ohio, has been designed primarily for flexibility and strength. Of particular interest is the boiler connection at the bottom of the water column. The bottom connection steel stud is



The Bottom Connection Steel Stud of this Water Column Is Made of Seamless Steel Tubing

made of seamless steel tubing which is attached to the body of the column by two large bolts which engage a lock flange, preventing the bolts from turning or slipping after the nuts have been tightened. The bottom connection has been constructed in such a manner that it can be cleaned without disturbing the piping. By removing the cleaning plug, a straight line is opened into the bottom of the column for cleaning.

Where conditions will not permit of standard application, the water column bottom extension can be lengthened so that the gage cocks and glass reading will line up with the boiler water level. The column is attached at the top by means of a bracket cast on the body making a three-point, rigid connection.

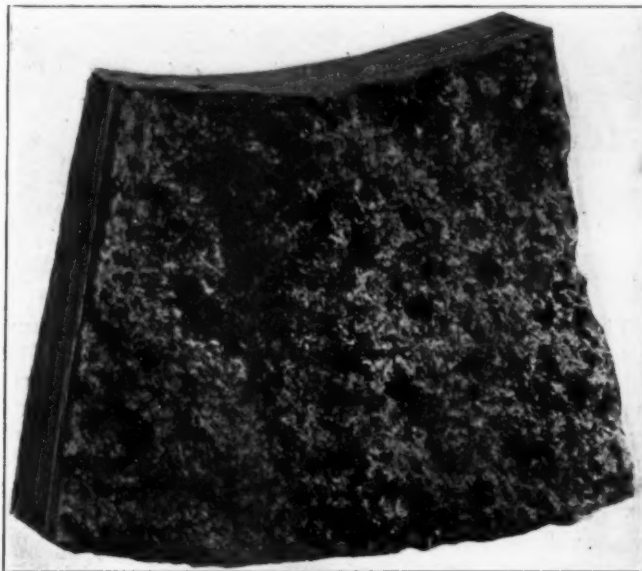
The fittings for the steam pipe are furnished with brazing tailpieces, or roll-over tailpieces, if desired. Flanged connections can be also furnished for both ends of the steam pipe.

The gage cocks and water glass cocks are located on the water column body in such a position as to allow sufficient space for their operation. The top water gage cock is set at an angle to eliminate the possibility of water traps. The water column has a lug cast on the side to carry a dripper. The water glass fittings can be constructed so that they will permit the use of any reflex water glass, sizes 1 to 9, inclusive, or any tubular glass of the same dimensions.

Locomotive Bronze

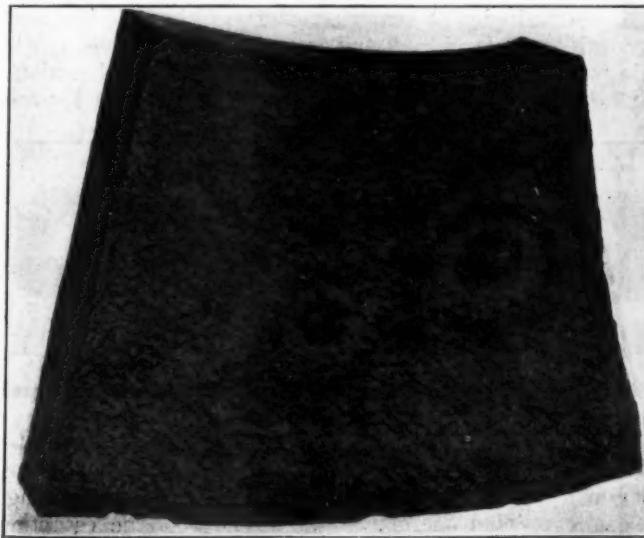
Crown Bearings

WHEN bronze crown bearings are cast in sand molds more or less trouble is experienced with sand in the surfaces which makes them difficult to machine, and with sand or blow holes in the body of



Specimen of Crown Brass Cast in a Sand Mold

the casting which cause many brasses to be thrown away before they have worn down to the wear limit. In an effort to overcome this difficulty, the More-Jones



Specimen of Crown Brass Cast in a Metal Mold

Brass & Metal Company, St. Louis, Mo., has adopted the practice of casting crown brasses in metal molds. This method is not entirely new but improvements have been developed by this company for which it has obtained patents.

An exhaustive comparative test has been made of bronze bearings cast in a chill and sand mold, the metal used being poured from the same pot. The results of these tests are shown below:

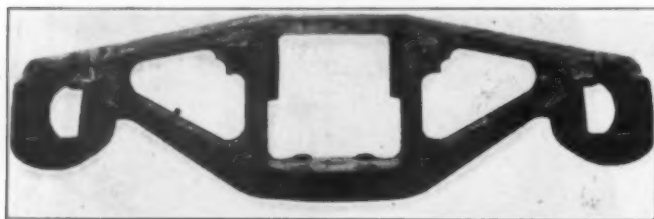
| CHEMICAL ANALYSIS | | |
|--|--------------------------|------------------------|
| | Sand mold, per cent | Chill mold, per cent |
| Copper | 72.70 | 72.55 |
| Tin | 7.10 | 7.15 |
| Lead | 18.80 | 18.95 |
| Zinc and impurities | 1.20 | 1.20 |
| Phosphorus | .05 | .05 |
| Undetermined | .10 | .10 |
| Brinell hardness number | 100.00 | 100.00 |
| Tensile strength, 2 in. standard test bar | 51 | 62 |
| Elongation in 2 in., per cent | 20,500 lb. per sq. in. | 29,500 lb. per sq. in. |
| Elastic limit in compression (load necessary to produce a permanent deflection of .001 when applied to a 1-in. cube) | 9.0 | 15.5 |
| Permanent deflection under load of 65,000 lb. per sq. in. when applied to a 1-in. cube | 11,800 lb. sq. in. | 15,500 lb. sq. in. |
| Permanent deflection under load of 65,000 lb. per sq. in. when applied to a 1-in. cube | .28 in. | .16 in. |
| TRANSVERSE BENDING TESTS | | |
| Specimens 1 in. cross section; distance between supports, 10 in.; load applied at center. | | |
| Load, lb. | Vertical deflection, in. | |
| | Sand mold | Chill mold |
| 500 | .013 | .009 |
| 1,000 | .035 | .026 |
| 1,600 | .063 | .047 |
| 2,300 | .340 | .140 |
| 2,400 | Specimen failed | .175 |
| 2,750 | | .300 |
| 3,200 | | .405 |
| 3,600 | | .520* |

*Specimen started to fail.

The tests show that the pressure chilled cast bearings possess approximately a 50 per cent increase in the physical properties over the sand cast bearings. Furthermore, the chilled mold casting weighs five per cent more per cubic inch because of its density. The increased load factor and strength, due to the density of the pressure chilled cast bearing, are not the only real improvements; the pressure chilled cast bearings are free from sand, grit, oxidization and impurities.

Truck Side Frame of Channel-oval Section

THE Ohio Steel Foundry Company, Lima, Ohio, after an extended study of side frames from the standpoint of manufacturing, efficient design and strength, has developed and patented a cast steel truck side frame having a combination channel and oval section. This design, a drawing of which is shown in Fig. 1, pro-



Ohio Steel Foundry Company 40-Ton Channel-oval Integral Box Frame

vides for a decreased metal line, a better position of the diagonal members, more uniform stress and the casting is easier to manufacture in the foundry. The essential difference between an ordinary channel section and the oval section is that the mean metal line of the oval section

is shorter than that of a channel section of the same width and height. Referring to Fig. 2, the metal line is a line drawn through points equidistant from the inside and outside surfaces of a cross sectional area. Since the length of the metal line is less, the cross sectional area is less. The total areas where two sections have equal metal

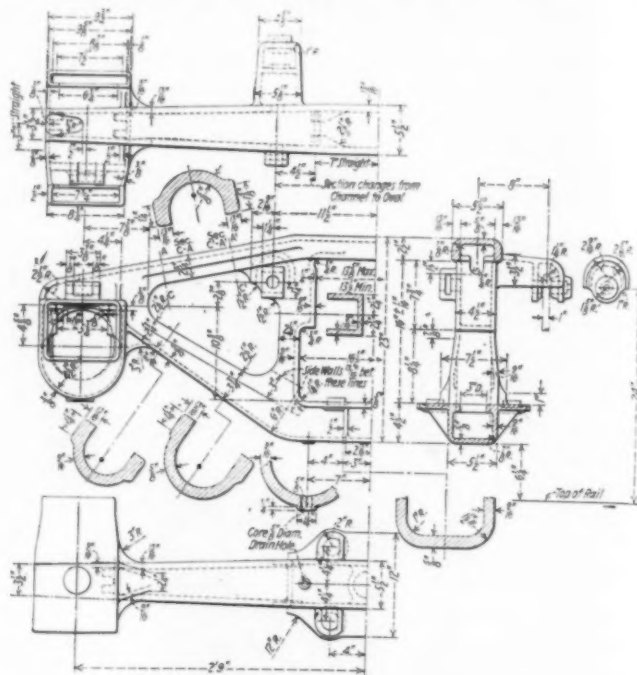


Fig. 1—Drawing Showing the Arrangement and Various Sections of the Channel-oval Side Frame

thicknesses being in direct proportion to the metal lines. Therefore, the oval section permits of a greater latitude in its formation and the inherent advantage of the shorter metal line permits the following alternative: decreased cross sectional area, thicker metal wall, increased width of section or an increased depth of section.

The saving in area due to the shorter metal line of the

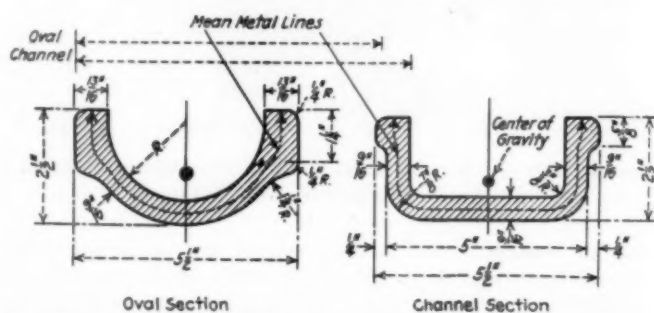


Fig. 2—Comparison of the Length of the Mean Metal Line of Two Frame Sections

new section may be employed either partially or completely to reduce the width of the frame. It may be distributed in any one of the ways outlined above or in any combination of two or more. For example, the saving in area may be used either to thicken the metal wall, or increase the depth of the side walls. Again a new oval section may be designed having both the thickness and depth increase over that of a channel section of equal area. Since the center of gravity of the oval section is in close proximity to the line of force to be transmitted, it provides a better position of the diagonal frame members than it is possible to secure in the ordinary channel frame.

In order that a member transmitting a direct force may be subjected to direct stress only, a line drawn through the centers of gravity of the adjacent sections must coincide with the force line. The center of gravity of the oval section is nearer the mid-position than it is in a frame of similar outline, but employing the channel section throughout. In addition to the center of gravity being at a greater distance from the outer edge in sections of equal depth, the side wall may be and usually is, increased, after moving the center of gravity from the outer edge. The oval section, therefore, aids in two ways in bringing the body of the resistant metal of the members in closer coincidence with the lines of force.

The angle portions of both the tension and compression members of the ordinary types of side frames are subjected to different stress values at certain locations. The vertical load stress determined from the movement measured by a strain gage is much higher than for a uniform distribution, while at positions directly opposite on the same member, the stress is correspondingly low. This condition is remedied to a great extent by a shifting of the center of gravity lines, and the stresses in the oval section are greatly reduced. It lends itself to a reduction of metal where stresses are low and an increase where they are high.

The channel-oval section side frame provides for channel section construction at and near the center of the frame where the greatest resistance to transverse and twisting forces is required. As the transverse and twisting forces decrease from the columns outward, the design tapers gradually into the oval section near the end portions.

The oval section portion gives a more efficient construction at the journal box. Another important feature of this type of section is that it does away with sharp corners which sometimes causes trouble in castings subjected to severe stresses and service shocks.

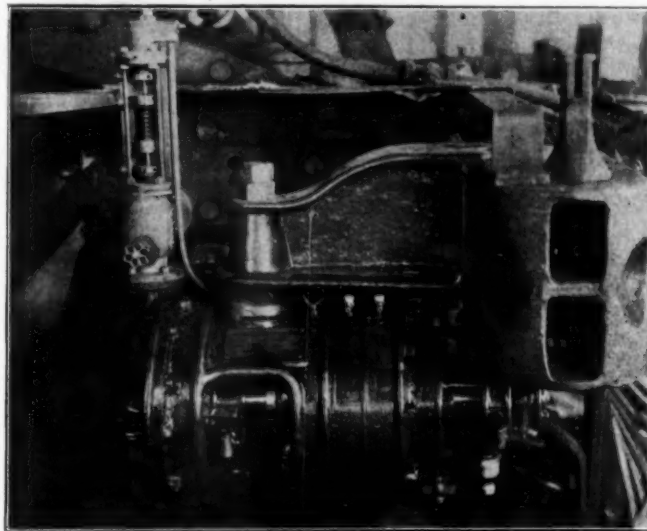
Side frames of this type were subjected to severe strain gage and fatigue tests. Under combined vertical, transverse and twist loads, two 40-ton channel-oval integral frames showed remarkable uniformity of stress as well as resistance to fatigue. It is customary to design the side frames for a vertical load equal to $1\frac{1}{2}$ times the axle capacity. For a 40-ton frame, the vertical design load is $1\frac{1}{2}$ times 31,000, or 46,000 lb. The transverse load assumed to act on each frame is 0.4 of the capacity of one axle, or 12,400 lb. The actual or measured stresses were taken with a vertical load of 88,000 lb. or 184 per cent more than the capacity of one axle instead of the 50 per cent increase used in arriving at the calculated stresses. The transverse load used in the tests was 10,500 lb. or 84.7 per cent of 12,400 lb. used in the calculated stress considerations. If the actual stresses for two of the applied loads, the vertical and transverse, had been found independently, their values could have been proportioned for their loads. However, the combined stresses for the three loads show a remarkable uniformity and low stresses for the loads used.

Turbine Driven Centrifugal Turbo Boiler Feed Pump

THE Type TB steam turbine driven and electric motor driven centrifugal turbo boiler feed pump shown in the illustration, is a complete unit in itself with one shaft common to the pump and its driver. The water end has one to four stages, with single suction enclosed impellers and enclosed guide vane rings which

transform the kinetic energy of the water into pressure. The pump discharge is vertical at the top of the main casing and the suction opening horizontal on either side. The shaft is protected throughout its length by bronze sleeves and wherever it passes through the radial walls of the pump casing, the latter are provided with bronze bushings of the floating type.

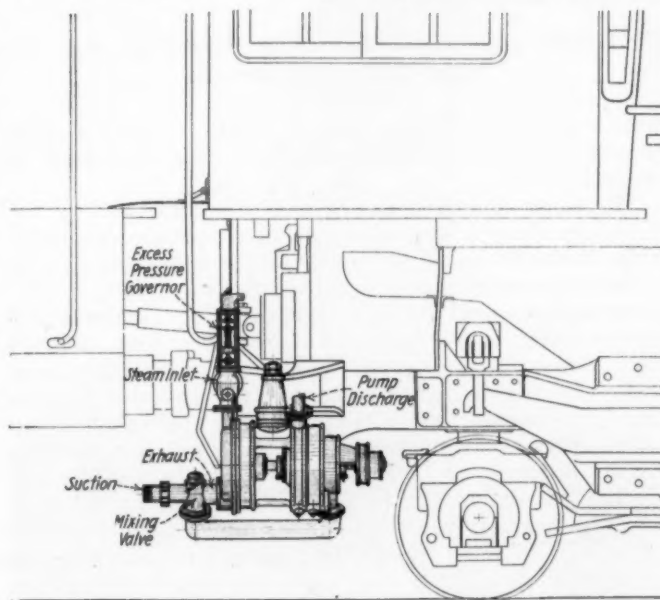
The turbine is of the two row velocity stage impulse



Coppus Boiler Feed Pump Hung from the Bumper of a Locomotive

type with a stationary reversing sector between the two rows of buckets. The steam enters a steam chamber in the cover and is then admitted to the individual steam nozzles. The exhaust opening is also in the steam cover.

The electric motor-driven pumps are equipped with polyphase, constant speed, two pole, squirrel cage induction motors of 40 deg. temperature rise, rated at



The Coppus Boiler Feed Pump Hung from the Locomotive Frame Under the Cab

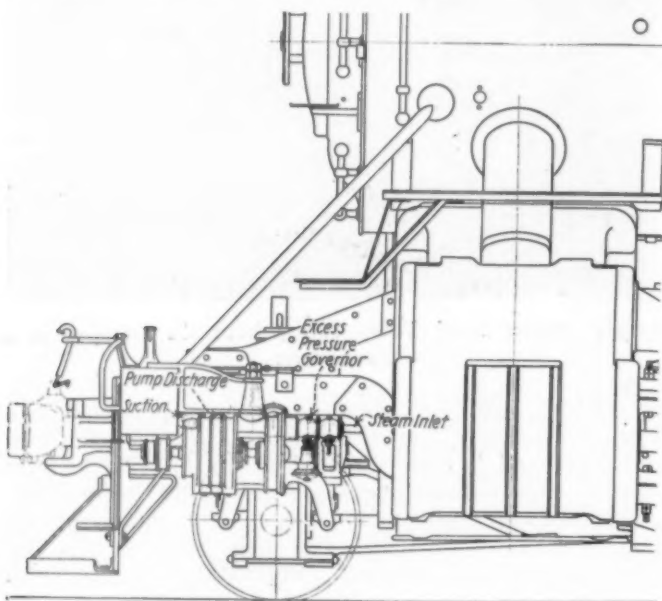
ample capacity to prevent overloading of the motor. A fan for ventilating the motor is provided.

In the application of the outfit shown in Fig. 1, the pump takes hot water from an overhead tank and pumps it directly into the boiler, the pump handling the water

at temperatures around the boiling point, 212 deg. F., and sometimes higher when there is back pressure on the open feedwater heater. The exhaust of the pump is discharged directly into the heater.

When the pump is hung from the frame under the cab as shown in Fig. 2, it takes the cold water from the tank and pumps it through a closed heater into the boiler. The exhaust of the pump mixes with the water from the tender or it may be discharged with the exhaust of the other auxiliaries to the closed heater.

In both cases, the pump is supplied with live steam from the cab, the engineman opening the valve fully. As long as the boiler takes any water at all he has nothing further to do with the steam supply, that is, if he wants the pump to operate he opens the steam supply valve fully, if he wants the pump to shut down entirely, he closes the valve fully. As the boiler usually takes



The Coppus 1½-in. Three Stage Boiler Feed Pump Attached to the Locomotive Bumper

some water, even during stops, this valve is opened when he starts on the run and closed when the destination is reached.

The water delivered by the pump is controlled by the discharge valve which the engineman operates manually. This discharge valve is provided with a by-pass so that if the engineman closes the discharge valve fully a little water still is discharged. Thus, as long as the steam supply valve to the pump is open, the pump delivers some water. The pump, therefore, is manually controlled by the discharge valve, but the amount of steam supply to the turbine is automatically controlled by an excess pressure governor which automatically throttles the steam supply in accordance with the amount of water discharges so that the pressure in the discharge line is never more than five or ten pounds higher than the boiler pressure. In other words, just enough to overcome the friction in the pipe.

The pump is further provided with an excess speed governor so that if the pump, by accident, should be started up when not supplied with water, it will stop automatically at a predetermined speed somewhat above the highest speed at which it operates when working normally.

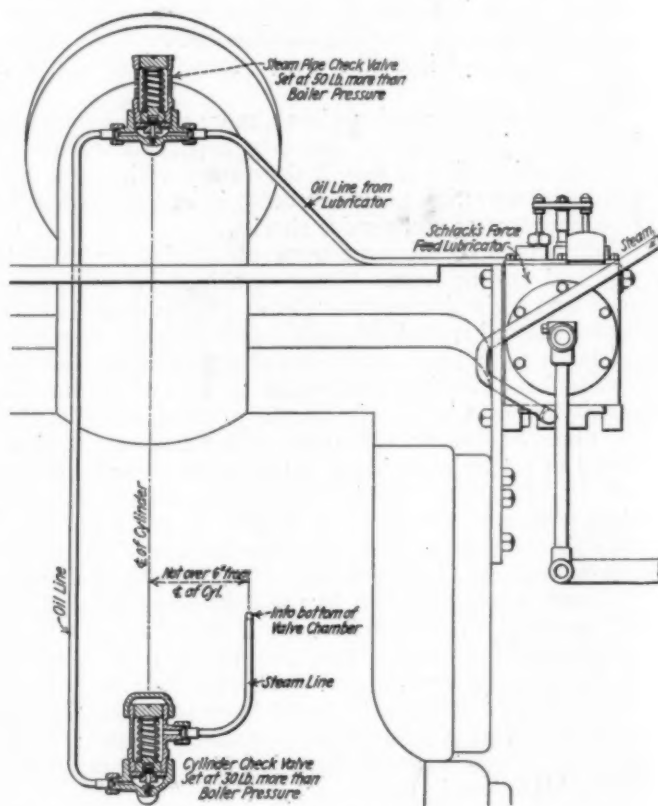
The pump is provided with a unit drain; all the stages and chambers of the pump, where water accumulates, are drained by opening a single valve, the different

chambers being separated by valves which automatically close when the pump is put in operation and automatically open when the pump is shut down. The 1½-in. pump has roughly a maximum capacity of 100 gal. and the 2 in. pump of 150 gal. per min. This equipment is manufactured by the Coppus Engineering Corporation, Worcester, Mass.

Alternate Valve and Cylinder Lubrication for Locomotives

WITH the system of alternate valve and cylinder lubrication for locomotives shown in the illustration, all of the oil is delivered into the steam pipe when the locomotive is working steam, but when the locomotive is drifting, all of the oil is delivered directly into the cylinders. In the alternate system there is a check valve in each cylinder in addition to a check valve in each steam pipe for each feed. The steam pipe check valve is set with a spring pressure to release at 300 lb. per sq. in. and has one oil inlet and two oil outlets. The cylinder check valve is set with a spring pressure to release at 250 lb. per sq. in. and has one oil inlet and one oil outlet and in addition has one steam inlet.

An oil pipe conveys the oil from the lubricator to the



Piping Arrangement for Schlack's Force Feed Lubricator

steam pipe check valve. Another oil pipe conveys the oil from the steam pipe check valve to the cylinder check valve. A steam pipe conveys the pressure from the pressure chamber of the main valve of the locomotive to the chamber on top of the diaphragm of the cylinder check valve.

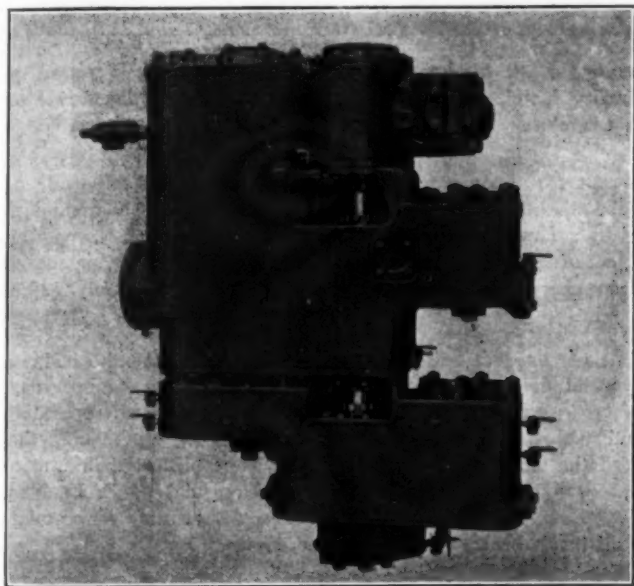
When the locomotive is working steam, the steam pressure added to the spring pressure of 250 lb., the cylinder check valve holds the cylinder check valve spring to a higher oil pressure release than the steam pipe check valve

with a spring pressure of 300 lb. The result is that all of the oil is injected into the steam pipe while the engine is working steam.

When the engine is drifting, the cylinder check valve is relieved of the steam pressure when the locomotive throttle is closed, so that it opens at the spring release pressure of 250 lb. This pressure being less than the spring release pressure of 300 lb. of the steam pipe check valve, all of the oil is injected directly into the cylinder. This lubricating system has been placed on the market by the United States Metallic Packing Company, Philadelphia, Pa.

Worthington Builds Larger Size Feed Water Heater

A LARGER size locomotive feed water heater, capable of delivering 10,000 gallons of feed water per hour is now manufactured by the Worthington Pump & Machinery Corporation, New York. It was developed for installation on the larger freight locomotive



Size 4½ Feed Water Heater with a capacity of 10,000 gals. of Water an Hour

tives now being used in many railroads and is known as the No. 4½ size. This heater is similar to the other open type feed water heaters built by this company, the only difference being that of size and capacity.

DuPont-Simplex Type B Stoker Performance Data

IN the May 31, 1924, issue of the *Railway Age*, there appeared a description of the DuPont-Simplex Type B Stoker, manufactured by the Standard Stoker Company, Inc., New York. This simplified design was intended to deliver and properly distribute sufficient coal of any grade to operate any locomotive under the most severe conditions, to be simple to operate and low in maintenance cost.

The actual service performance of the stoker during the past year has apparently substantiated the results aimed

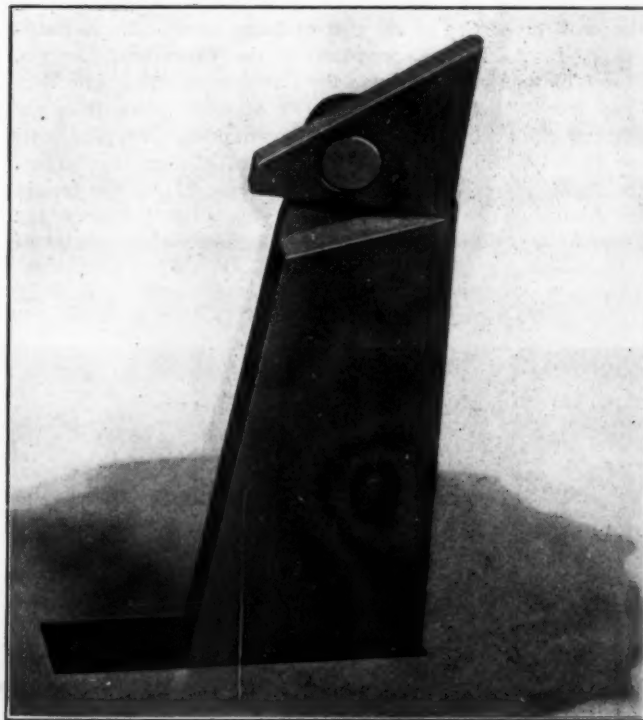
at in the design. It is handling with success, all grades of coal either dry or wet. One railroad is using lignite as a fuel, which this stoker is handling successfully and the absence of the elevating screw has offered no difficulty in firing locomotives with frozen coal.

The available data pertaining to the maintenance cost of this stoker is incomplete. Figures submitted by one road, however, show that a Mikado type locomotive made 72,000 miles with a maintenance cost less than \$30.00. A railroad of the northwest having 10 locomotives equipped with the Type B stoker reports that 106,203 locomotive miles have been made without a failure or delay.

A Mallet locomotive of a western road which when hand fired, consumed from 290 to 350 lb. of coal per 1,000 gross ton-miles, now equipped with the Type B stoker, shows an average consumption of from 209 to 211 lb. of coal per 1,000 gross ton-miles. A saving in coal consumption is also indicated in a report submitted by a western road operating a group of Santa Fe type locomotives. When hand fired, these locomotives required 180 lb. of coal per 1,000 gross ton-miles. Since being equipped with the Type B stoker the coal consumption has been reduced to 118 lb. per 1,000 gross ton-miles.

Grate Shaker Bar Posts Provided with Security Latch

MANY accidents are caused by grate shaker bars slipping off the shaker posts while shaking the grates on a locomotive. In an effort to reduce such accidents to a minimum, the United States Metallic Packing Company, Philadelphia, Pa., has placed on the



Security Latch on the Grate Shaker Bar Post Prevents the Shaker Bar from Slipping Off

market a security latch which is applied to the shaker bar post. The illustration shows its simplicity of design.

When shaking the grates, the fireman places the bar over the shaker bar post in the usual manner. The se-

curity latch automatically falls into place, locking the bar on the post. No further attention is required on the part of the fireman while shaking the grates. To remove the

the peach producing district, to the 52 principal markets of the United States, is 8 cents a basket. Each basket of peaches contains from 18 to 24 peaches. Therefore, the freight rate is about



From Left to Right the First and Second Illustrations Show the Placing of the Shaker Bar on the Post and the Position of the Latch While Shaking the Grate, the Third Shows How the Security Latch is Released and the Fourth the Removal of the Grate Bar from the Post

bar, the locking device must be released. This can be done by the pressure of the foot on the latch.

TRANSPORTATION OF ONE DINNER, ONE CENT.—Calling attention to the small proportion of the cost of living attributable to transportation, L. A. Downs, president of the Central of Georgia, addresses himself particularly to the ultimate consumer who does not pay freight directly. On the price of most commodities the freight cost is a negligible factor in the retail price. A typical hotel dinner of roast beef, bread, butter, potatoes, lettuce, strawberries, coffee, sugar, pepper and salt, would cost about \$1.00. The freight cost of assembling this typical dollar meal is about 1 cent. The average freight rate on peaches from Fort Valley, Georgia, the center of

one cent for three peaches. A careful study has been made of freight charges on the food, clothing, fuel and household supplies used by a family of six persons living in Columbia, S. C., with an income of \$1,800 a year. It shows that the total amount of freight charges on all their purchases amounts to only \$39.90 per year.

THE GULF, MOBILE & NORTHERN reports for the month of May a movement of freight cars averaging 40.2 miles per car per day, an increase of about 25 per cent over the record for the preceding month and also over the record for May, 1924. In making this record the officers and employees have accomplished their aim to equal or exceed 40 miles per car per day; and C. E. Lanham, superintendent of transportation, has issued a circular congratulating all hands on the success of their efforts.



An Early D. & H. Coach

General News Department

William H. Johnson, president of the International Association of Machinists, has been re-elected to that office, as appears from the report of the election canvassed at the headquarters of the association in Washington, D. C., on June 1. E. C. Davidson was re-elected secretary-treasurer, and Fred Hewitt editor of the Machinists' Journal.

In the annual committee election of representatives of the six shop crafts of the Pennsylvania on five divisions of the Western region, under the Pennsylvania employee representation plan, 92.7 per cent of the shopmen participated. The highest percentage of shopmen voting was on the Grand Rapids division, where 97.5 per cent of the eligible men voted, the Ft. Wayne division shop employees coming next with 94.9 per cent.

H. J. Forster, secretary of the American Railway Association, announces that the modifications of car service Rule 11, set forth in his circular No. 2524 have been adopted by the association, as shown by the letter ballot which he has just recorded. This rule provides for marking freight cars with both nominal capacity and load limit, and for showing the cubical capacity with the inside dimensions.

Supreme Court Limits Authority of Labor Board

The United States Supreme Court, in a decision rendered on June 8, reversed that of the federal district court of Chicago directing **D. B. Robertson**, president of the Brotherhood of Locomotive Firemen and Enginemen, to appear as a witness in response to a subpoena issued by the Railroad Labor Board. The government contended that the law intended to permit the board to apply to any district court to enforce its subpoenas and compel the attendance of witnesses, but the Supreme Court holds that the law contemplated a court of competent jurisdiction; and **Mr. Robertson**, being a resident of Cleveland, Ohio, was not within the jurisdiction of the federal court in Illinois.

Group Life Insurance on L. & N.

The Louisville & Nashville Railroad and the Prudential Insurance Company of America announce a contract, to go into effect on July 1, for life insurance for the railroad's employees, which it is said will provide a total coverage of about \$150,000,000. This sum is considerably larger than the total reported by the Southern Pacific, whose group insurance contract is the largest heretofore reported. The L. & N. contract is said to include about 60,000 employees. It takes in those of the two subsidiary roads controlled by the Louisville & Nashville—the Nashville, Chattanooga & St. Louis and the Louisville, Henderson & St. Louis. Employees whose pay is less than \$100 a month may be insured for \$1,000; where the pay is \$100 but not more than \$175, insurance for \$2,000; and employees earning more than \$175 may take \$3,000. The contract includes the usual provisions for permanent total disability, etc.

Great Northern to Hold Stores Convention

The Great Northern will hold a system convention of stores officers at Superior, Wis., on June 19 and 20. This is the second annual meeting of the system store organization, which was inaugurated last year. Sessions will be held in the Hotel Amboy, under the direction of the president, Howard Hayes, general storekeeper, and a general committee. Reports of committees and papers will be presented on the following subjects: Scrap handling and reclamation; handling of building and bridge work sheets; developments at the annual meeting of Division VI, A. R. A.; short cuts and methods in store department accounting; handling and storing lumber; fire protection; mechanical appliances; beautifying store grounds; controlling and distributing

store stock and the inspection and testing of material. The proceedings of this meeting will be conducted after the manner of the proceedings of Division VI, A. R. A.

Seniority of Negro Switchmen

The Railroad Labor Board, in a dispute between the Illinois Central and the Association of Colored Railway Trainmen over an alleged violation of the yardmen's agreement at Memphis terminal by the restriction of colored switchmen's seniority to head-on service only, has decided that the provisions of the rules of the schedule of wages governing service, age or seniority rights of yardmen in the Memphis terminal, shall be complied with without any discrimination in favor of or against either white or colored yardmen. In its opinion, the board said that colored switchmen, under the rules, have equal privileges of exercising seniority rights as white switchmen on all yard crew positions other than foreman—such as so-called head-end men, rear-end men, long-field men, liners, etc. To grant white switchmen the right to exercise a seniority in preference to such positions and to refuse colored employees the right to exercise a similar preference, is a discrimination that is a violation of the provisions of the rules, concluded the Labor Board.—*Decision No. 3534.*

Committees of the Safety Section

J. C. Caviston, secretary of the Safety Section of the American Railway Association, has announced the membership of the committees of the Section for the ensuing year. The lists are as follows, the first named in each case being the chairman of the committee:

Committee of direction: **Robert Scott** (A. C. L.); **T. H. Carrow** (Penn.); **L. F. Shedd** (R. I.); **H. A. Adams** (U. P.); **C. T. Bailey** (O. S. L.); **D. H. Beatty** (Sou.); **L. G. Bentley** (C. & O.); **W. A. Booth** (C. N.); **C. E. Hill** (N. Y. C.); **F. M. Metcalfe** (N. P.); **R. L. Pilling** (L. & N.); **J. L. Walsh** (M-K-T.).

Committee on nominations: **J. D. White** (I. C.); **C. L. LaFountaine** (G. N.); **M. McKernan** (M. P.); **F. W. Mitchell** (N. Y., N. H. & H.); **E. R. Scoville** (B. & O.).

Committee on prevention of highway crossing accidents: **H. A. Rowe** (D. L. & W.); **D. H. Beatty** (Sou.); **C. T. Bailey** (O. S. L.); **T. P. Brennan** (L. I.); **T. H. Carrow** (Penn.); **J. G. Fitzhugh** (G. C. & S. F.); **D. G. Phillips** (Wabash); **J. L. Walsh** (M-K-T.); **J. D. White** (I. C.).

Committee on publicity and education: **L. G. Bentley** (C. & O.); **E. R. Cott** (H. V.); **A. V. Rohweder** (D. M. & N.); **E. R. Scoville** (B. & O.); **L. F. Shield** (R. I.).

Committee on statistics: **T. H. Carrow** (Penn.).

Report on Derailment at Nearman, Kan.

The Interstate Commerce Commission has issued a report dated April 22 and signed by **W. P. Borland**, director of the bureau of safety, on the derailment of eastbound passenger train No. 104 of the Missouri Pacific at Nearman, Kan., on February 7, when four employees and two trespassers were killed and 32 passengers and other persons were injured. The derailment was due to a defective locomotive, and this locomotive, together with another one attached to a freight train standing on a side track, was wrecked. Both enginemen and both firemen were killed. The passenger train was running at about 45 or 50 miles an hour, and its locomotive, when it struck the freight engine, was completely turned around and overturned.

The main portion of this report is made up of a study by **James E. Howard**, engineer, who examined the locomotives. The conclusion that the fault was in the locomotive is "in some degree speculative," based on the very good condition of the track and the absence of any evidence of other causes. The spring-hanger bolt in the forward end of the right-hand equalizer bar

of the leading truck was found broken, and this is held to be the primary cause. The failure allowed the truck to become unevenly loaded, permitting one of the four wheels to jump the rail.

The report contains photographic engravings showing the wrecked locomotives and also one of an axle box, showing where the equalizer bar had ridden on the top surface of the box.

April Earnings

Class I railroads, having a total mileage of 236,665 miles, had gross operating revenues in April amounting to \$473,496,550, a decrease of \$1,735,600 or two-fifths of one per cent, as compared with the same month last year, according to reports compiled by the Bureau of Railway Economics. Operating expenses totaled \$370,623,400, a reduction of \$7,203,500 or nearly two per cent under those for the same month last year although the railroads in April this year carried approximately five per cent more freight traffic than they did in April, 1924. The net railway operating income was \$66,199,236, as compared with \$62,298,527 in April last year or an increase of \$3,900,709.

The net railway operating income for the first four months this year amounted to \$270,104,080, which was at the annual rate of return of 4.38 per cent on property investment, as compared with \$265,669,375, or 4.45 per cent, for the same period last year.

Earnings by districts for the first four months this year with the percentage of return based on property investment on an annual basis were as follows:

| | | |
|-------------------------------|--------------|-------|
| New England region | \$12,196,646 | 5.35% |
| Great Lakes region | 53,329,047 | 5.40% |
| Central Eastern region | 54,955,368 | 4.51% |
| Poconos region | 17,866,496 | 6.45% |
| Total Eastern district | 138,347,557 | 5.10% |
| Total Southern district | 53,184,680 | 5.66% |

| | | |
|------------------------------|---------------|-------|
| Northwestern region | 14,773,974 | 1.92% |
| Central Western region | 38,778,941 | 3.35% |
| Southwestern region | 25,018,928 | 4.27% |
| Total Western district | 78,571,843 | 3.13% |
| UNITED STATES | \$270,104,080 | 4.38% |

Thirty-four Class I railroads operated at a loss in April, of which 12 were in the Eastern, 1 in the Southern and 21 in the Western districts. In March, 28 had operating deficits.

Expenditures for maintenance made by Class I carriers in April totaled \$172,762,761, a decrease of \$2,784,690 or 1.6 per cent under those of April last year. Maintenance of way expenditures totaled \$68,091,819, virtually the same as in April last year, while expenditures for maintenance of equipment totaled \$104,670,942, a decrease of nearly \$2,840,000 compared with April one year ago.

Carriers in the Eastern district had a net operating income in April of \$38,960,550, compared with \$34,448,630 in April last year. Freight traffic in the Eastern district in April, according to incomplete reports, was about nine per cent above that of the corresponding period last year. Gross operating revenues of the Eastern carriers totaled \$241,456,551, an increase of nearly one per cent. Operating expenses total \$184,814,400, a decrease of nearly two per cent. Class I carriers in the Eastern district during the first four months this year had a net operating income amounting to \$138,347,550, as compared with \$133,464,530 for the corresponding period last year.

Class I carriers in the Southern district in April had a net operating income of \$12,135,990, as compared with \$11,020,880 in April last year. Freight traffic on the Southern roads in April was about eight per cent over that of the same month last year. Gross operating revenues of the Southern carriers in April totaled \$67,393,550, an increase of 2.5 per cent, while operating expenses totaled \$50,052,650, a decrease of nearly one per cent. The net operating income for the Class I roads in the



April Meeting, Pennsylvania Station Agents, Middle Division—S. E. McMaster, Supervising Agent, Presiding

KNEELING, LEFT TO RIGHT—

| | |
|---------------------------------|-------------------------------------|
| 1 J. H. Hardman, Bedford | 6 S. E. McMaster, Supervising Agent |
| 2 O. G. Donnelly, Mapleton | 7 L. A. Garber, Roaring Spring |
| 3 C. E. Kline, Mill Creek | 8 T. K. Henderson, Mexico |
| 4 F. J. McCann, Altoona Baggage | 9 E. I. Coder, McVeytown |
| 5 G. P. Towsey, Mt. Union | 10 J. S. Wertman, Alexandria |

STANDING, LEFT TO RIGHT—

| | |
|--------------------------------------|---------------------------------------|
| 1 J. R. Davis, Mann's Choice | 8 John Dixon, Oremine |
| 2 W. A. Yingling, Cumberland Freight | 9 L. F. Campbell, Martinsburg |
| 3 H. A. Sides, Extra Agent | 10 C. E. Straesser, Curry |
| 4 J. F. Cessna, Mt. Dallas | 11 C. R. Moore, C. C. Altoona Freight |
| 5 R. C. Crissey, Queens | 12 J. H. Leffard, Bellwood |
| 6 C. C. Barley, Hyndman | 13 S. F. Dunn, Birmingham |
| 7 G. C. Bard, Newton Hamilton | |

STANDING—CONTINUED

| | |
|---|---|
| 14 A. M. Robinson, Port Royal | 27 W. C. Fisher, Extra Agent |
| 15 A. R. Lantzer, Hollidaysburg | 28 M. J. Heckendorn, East Freedom |
| 16 C. D. White, Williamsburg | 29 G. B. Garber, Hollidaysburg Freight |
| 17 S. A. Hamilton, Huntingdon Freight | 30 A. T. Heintzelman, Altoona Freight |
| 18 D. S. Miller, Duncannon | 31 R. M. Guttschall, Fishertown |
| 19 C. I. Fuller, Altoona Ticket | 32 G. S. Hibbs, Thompsonstown |
| 20 L. W. Brimmer, Newport | 33 L. C. Curry, Granville |
| 21 W. H. Gardner, Horrell | 34 M. H. MacQuown, Division Freight Agent |
| 22 T. M. McCamant, Huntingdon Passenger | 35 H. P. Cox, R. L. Franklin's Office |
| 23 F. M. Emerick, Mifflin | 36 G. E. Hillegas, Spruce Creek |
| 24 C. H. Quigley, Lewistown Passenger | 37 Ross Richardson, Chief Clerk to Division Freight Agent |
| 25 C. R. Prosser, Hollidaysburg Scales | |
| 26 H. R. McCreary, Petersburg | |

Eight agents were not present

Southern district for the first four months this year was \$53,184,680, as compared with \$49,666,000 for the same period last year.

Carriers in the Western district had a net operating income in April of \$15,102,690, as compared with \$16,829,000 for the same month last year. Freight traffic in the Western district showed a decrease of approximately one-half of one per cent. Gross operating revenues of the Western carriers totaled \$164,646,440, a decrease of 2.8 per cent, while operating expenses totaled \$135,756,670, a decrease of 2.6 per cent. Class I carriers in the Western district in the first four months this year had a net operating income of \$78,571,840, as compared with \$82,538,800 for the same period one year ago.

General Rate Investigation Ordered in Canada

In an Order in Council made public on Friday evening, June 5, the Canadian government announced its policy in regard to the equalization of railway freight rates as between the various sections of Canada. In the order the Dominion Railway Board is looked to as the only proper instrument for dealing with the present chaotic rate situation, and the following instructions are given to the Board, in brief:

Institute as soon as possible a general investigation of the freight rate conditions throughout the Dominion with a view to removing, as far as possible, discrimination as between geographical divisions. Disregard special rate agreements made by Parliament, such as the Canadian Northern pact with the province of Manitoba and especially the Crow's Nest Pass Agreement, in seeking such equalization, with this important exception, that the eastbound rates on grain and flour from the Prairie Provinces must be preserved as they are in the Crow's Nest Agreement. Pay close attention to the demands of the Maritime Provinces for a restoration of the rates they enjoyed prior to 1919 and for the encouragement of traffic through Canadian ports. Also, do all possible to facilitate the movement of freight through the Pacific ports of Canada, which means that some adjustment of what British Columbia terms the mountain rate discrimination will be expected. Enabling legislation in relation to this order was introduced in the House of Commons at Ottawa this week by George P. Graham, Minister of Railways and Canals.

The Smoking Hazard

DeWitt Rapalje, engineer of the Railroad Insurance Association, New York City, believes that many "NO SMOKING" signs have, under existing conditions, about the same deterrent effect on railroad employees as they would have on a locomotive if tacked up on the front end of its boiler. In a paper prepared for the National Fire Protection Association, he says:

Locomotives often do a lot of smoking, but there is a more promiscuous smoker and a greater fire hazard on the railroads, and that is the careless employee. Matches and smoking, among the known causes reported annually, average over 300 fires and about half a million dollars of railroad property burned. No doubt many of the fires of "unknown" origin may belong in this group. Efforts to reduce this hazard which consist only of posting "No Smoking" signs at every conceivable point are frequently misdirected and are of about as much value as a fuel economy campaign would be which consisted of tacking a "No Smoking" sign on the front end of every locomotive.

Railroad employees generally have rough and dirty work to do as their daily task and efforts to convert them all to the non-smoking class are bound to meet with scant success. Most of them want to smoke, and they do so regardless of all the signs.

Smoking is a general habit and should be provided for by managements for employees the same as facilities are provided for passengers who smoke on trains and at stations. Provide safe and suitable smoking rooms and this serious fire hazard can be controlled. Rules against smoking can be enforced if they are applied only at the hazardous spots. The railroad record-room is a case in point. Fire inspectors are constantly reporting evidence of smoking in the typical record-room where large quantities of paper files are stored. This room generally affords one of the worst places for a cigarette butt or burning match to be left to its own inclinations. The file clerks smoke in these rooms because they can do so there without detection, while the office in which smoking might be safely indulged is filled with smoking prohibited signs.

Traffic News

The Public Service Commission of Oregon has filed a petition asking the Interstate Commerce Commission to reopen the proceeding relative to the Southern Pacific's control of the Central Pacific and to impose an additional condition requiring the Southern Pacific to grant to the Oregon Trunk, Union Pacific system lines, or others, joint use of Central Pacific lines in Oregon. The Oregon Trunk has asked the commission for a certificate authorizing the construction of an extension from a junction with the Central Pacific at Skookum, Ore., to Klamath Falls, 80 miles, paralleling the existing road of the Central Pacific for practically the entire distance, at a cost of \$3,840,000. This might be avoided by an arrangement for the joint use of the Central Pacific tracks.

S. P. & S. Bus Line Absorbs Competitor

In order to eliminate economic waste of duplicate service, the Spokane, Portland & Seattle Transportation Company bus line, operating as a subsidiary of the Spokane, Portland & Seattle, has taken over the Columbia Stages, a competing bus line operating between Portland, Ore., and Seaside. The purchase price of \$125,000 covered among other things 15 motor coaches which the Columbia Stages has had in operation. With this additional equipment the Spokane, Portland & Seattle will be enabled to offer augmented service without having to contend with wasteful competition. The railway subsidiary bus line was organized last year in order to hold passenger traffic for the Spokane, Portland & Seattle, which the independent bus line has been absorbing. The highway used by buses between Portland and Seaside parallels the railway line of the Spokane, Portland & Seattle for almost the entire distance. Buses supplement the train service.

B. & M. Proposes Highway Passenger Routes

The Boston & Maine Transportation Company has filed with the Public Service Commission of New Hampshire, applications for authority to establish four motor coach routes intended to provide passenger service in new territory or to supplement service now given by passenger trains. These lines are: Plymouth to Lincoln, through Campton, Thornton and Woodstock; Franklin and Franklin Falls to Bridgewater through Hill and Bristol and along the shores of Newfound Lake; Concord to Dover, through Chichester, Epsom, Northwood, Barrington and Madbury; Concord to Sunapee and Newport, through Hopkinton, Warner, Bradford and Newbury, and along the shores of Lake Sunapee.

The line from Plymouth to Lincoln will afford the extra passenger service always provided for summer travel into the southern edge of the Franconia Notch section of the White Mountains. It will parallel and supplement the Pemigewasset Branch of the Boston & Maine Railroad. The line from Franklin to Bridgewater will open up a new service in territory untapped hitherto by organized transportation, while the motors may ultimately displace the passenger trains on the Bristol Branch, between Franklin and Bristol.

The service to be supplied by the motor coaches on the Concord to Dover route will be an entirely new one. To such extent as this line may tend to divert travel from the Suncook Valley Railroad, the B. & M. announces that it will accept passengers between those points only under full agreement with the management of the Suncook Valley Railroad, and subject to sanction by the Public Service Commission.

The establishment of motor coaches from Boston to Portland, Me., and to the White Mountains is also announced. This experiment is an effort to determine the extent to which such services may offer attractions not presented by the railroad, and the extent to which such services may be developed along sound economic lines. The White Mountain service will be via Portsmouth, N. H., Intervale, N. H., and Bretton Woods, N. H., with a terminal at Bretton Woods or at Bethlehem.

Motor coach service by the Boston & Maine Transportation Company in place of the passenger trains on the York Harbor & Beach Railroad will be begun on June 22 between Portsmouth and York Beach.

Commission and Court News

Interstate Commerce Commission

Commission to Consider

Commutation Rates of C. & N. W.

The commission, on petition of the Chicago & North Western, has reopened its proceeding on intrastate rates within the State of Illinois for further hearing, for the purpose of determining whether the commutation passenger fares of that road in effect between points on its line in Illinois are such as to cause undue preference or prejudice. The North Western has been seeking for over four years to have the commission allow an increase in its suburban commutation fares into and out of Chicago and hearings on its application were held in December, 1920, but the case was never decided. The present action is on a petition filed by the road on May 15.

Commission Plans to Expedite Valuation

The commission in a press notice says that in making its plans for completion of the primary valuation of the steam railroads in the country within the three-year period from July 1, 1925, for which work Congress recently made available a large appropriation, it has found it necessary to restrict the granting of requests of interested parties for postponements of hearings, arguments, etc. It is now recruiting the force of the Bureau of Valuation and is preparing to set for hearing a large number of protest cases.

"The commission now classifies valuation as one of its major activities," the notice says, "and to carry out its plans for the completion of the primary valuation work, instructions have been issued to bureau officials charged with the conduct of the hearings to require all parties to proceed with cases when called, except as the parties may in timely manner present legal cause. The commission expects the co-operation of all interested parties in these requirements, which are essential to the completion of the work."

State Commissions

Uniform Crossing Warnings Required in New York

The Public Service Commission of New York on June 9 issued an order requiring that hereafter all automatic warning signals which may be installed at highway grade crossings on any railroad in the state shall be of the horizontal flashing type. This order will apply when new signals are installed or existing ones are replaced. The commission recommends the installation of the signals in the center of the highway upon each side of the railroad, whenever the physical conditions of the crossing will permit.

It is held by the commission, in a memorandum, that when the signals are in the middle of the road the lamps are always within the range of automobile drivers' vision, whereas they might not be if the signals were at the side of the highway.

Court News

Road Improvement Assessment

on Mileage Basis Held Discriminatory

Where a road improvement district assessment contemplated by a statute of Arkansas was to be on the basis of benefits realized from the proposed improvement, and it was shown in a suit by a railroad company for injunction to restrain its collection that the highway proposed would be a detriment rather than a benefit to the railroad, and that any benefit accruing to the railroad would be so speculative as to be unascertainable, the Circuit Court of Appeals, Eighth Circuit, held that an assessment against the railroad's property on a mileage basis, other real estate being assessed on an acreage basis, was arbitrary and discriminatory and

a denial of equal protection of the laws. A purported agreement between the railroad and the commissioners attempting to fix the benefits on a mileage basis was held void; and the assessment was not validated by acts of the legislature attempting to confirm it.—*Road Improvement Dist. No. 1 v. Missouri Pac.*, 2 Fed. (2nd) 340.

Loading Cattle at Rear of Train Not Negligence

The Texas Court of Civil Appeals holds that where plaintiff's cattle were injured in a collision, the fact that they were loaded at the rear end of the train could not be made the basis of recovery, though cattle loaded at the front escaped.—*Wichita Valley Ry. Co. v. Baldwin* (Tex. Civ. App.) 263 S. W. 1090.

Valuation for Taxation of

Railroad Water Front Properties

The New Jersey Supreme Court holds that in valuing for taxation railroad water front properties it is proper to consider fair value for average business, whether a greater value exists for railroad purposes, and the increment, if any, because of assemblage and consolidation of properties.—*Delaware L. & W. v. State Board of Taxes* (N. J.) 125 Atl. 921.

Delay by Pulling of Drawbar—Hours of Service Act

In a prosecution for violation of the Hours of Service Act by permitting a train crew to be on duty 17¾ hours, it appeared that the train was delayed for two hours by the pulling out of a drawbar, and that there was no intermediate terminal. The federal district court for the Eastern District of Illinois holds that the delay was caused by an unforeseen accident, and, no relay or terminal being between the place where the delay was caused and the end of the run, the railroad, in view of I. C. C. rule 88, par b, and rule 287, par. 1, was not guilty of violation of the act.—*U. S. v. Marion & Eastern*, 2 Fed. (2nd) 782.

Abandonment of Land Acquired

for Water Supply Not Shown

The federal district court for the Eastern District of Missouri holds that the acquiring by a railroad of property for the purpose of collecting and holding water thereon to supply its engines is for a public use. To constitute an abandonment of such property there must be an intention to abandon, followed by an actual relinquishment of possession so that the property abandoned is left free and open to be appropriated by the next comer. The mere fact that all the land is not covered by water does not constitute an abandonment.—*Summers v. Atchison, T. & S. F.*, 2 Fed. (2nd) 717.

United States Supreme Court

Liability as Delivering Carrier

Part of a carload of sugar shipped from Raceland, La., to Fort Smith, Ark., on a through bill of lading, was lost at Fort Smith while in possession of the St. Louis-San Francisco, which had been employed by the Missouri Pacific to switch the car to the consignee's warehouse. Action was brought against the Missouri Pacific and judgment for plaintiff was affirmed by the Arkansas Supreme Court (161 Ark. 579).

The Missouri Pacific denied liability on the ground that it was neither the initial nor the delivering carrier. The joint through rate covered delivery at consignee's warehouse. The bill of lading named Morgan's Louisiana & Texas R. & S. Co. as the initial carrier and the route designated therein named the Missouri Pacific as the last connecting carrier. Its lines do not extend to consignee's warehouse. It paid the St. Louis-San Francisco the switching charge of \$6.30. The switching carrier was not named in the bill of lading and did not receive any part of the through joint rate. The Supreme Court of the United States holds that the switching carrier "was simply the agent of the Missouri Pacific for the purpose of delivery. The Missouri Pacific was the delivering carrier and is liable as such." Judgment for plaintiff was affirmed.—*Missouri Pacific v. Reynolds-Davis Grocery Co.* Decided May 25, 1925. Opinion by Mr. Justice Brandeis.

Foreign Railway News

Austria Gets Loan for Electrification

The Austrian Federal Railways have been granted \$18,000,000 from the League of Nations' loan to Austria. The League's finance committee approved the loan and the money will be used to carry forward the Federal Railways' electrification program which had to be postponed because of the shortage of funds.

Irish Railways Not Doing Well

The railways of Ireland are experiencing decided reductions in traffic. For the first five months of the current year the Great Northern, the principal line in the northern part of the country, showed a decrease of 10 per cent in gross receipts as compared with the same period last year. The Great Southern, which includes most all of the lines operating in the Irish Free State, has experienced a still further decline—almost 15 per cent. Efforts are being made to reduce wages, but it is apparent that this will be exceedingly difficult to accomplish. Ireland has lost a great part of her profitable tourist trade through the frequent brawls in which the inhabitants have engaged and will now make an effort to attract it back by the use of publicity.

Miscellaneous

The following reports have been received by the Department of Commerce from its agents in various countries:

Ten locomotives were delivered to the Norte Railway of Spain during 1924, by the Compania Euskalduna. Ten more have been ordered for delivery during 1925, as well as 100 cars to be used on broad-gage lines and 51 cars for narrow-gage lines.

The net earnings of Swedish private railways decreased during 1924 from 4,950,000 crowns in 1923, to 3,820,000 crowns. The gross income during the later year was 152,940,000 crowns, while operating expenses amounted to 149,120,000 crowns. Passengers carried during 1924, amounted to 38,270,000, compared with 38,350,000 in 1923. The total freight tonnage increased from 19,170,000 in 1923 to 20,910,000 in 1924.

The re-establishment of German fast freight schedules became effective June 1. Before the war the fast freight schedule between Cologne and Berlin was 20 hours; since the Armistice it has taken from 28 to 30 hours to make the same trip. Conditions have now so far improved, however, that with the new schedule, several fast freights with a scheduled speed of 37 miles an hour are to be restored.

Standardization of rolling stock on the Indian railways has been announced in the Times of India as the future policy of the Indian Railway Board.

The Norte Railway (Spain) plans to secure new equipment during the next two years. Purchases of the following are planned: 138 passenger cars, 300 baggage cars, 1,750 closed freight cars, and 3,000 flat cars; at an estimated cost of 302,450,000 pesetas (about \$39,318,000).

Earnings of all the Spanish railways increased 3,889,451 pesetas (about \$518,755), during the period from January 1 to April 10. Gross earnings for this period of 1925 amounted to 87,530,864 pesetas as against 83,641,413 for the preceding year.

New Yugoslav Line to Be Completed Soon

The completion of the Yugoslav Lika railway, between Ogulin, Croatia, and Split, Dalmatia, is expected in July, says Consul Davis at Zagreb. The tracklaying was greatly delayed by bad weather in March, and there are still 32 kilometers to be laid on the 64-kilometer stretch between Gracac and Knin.

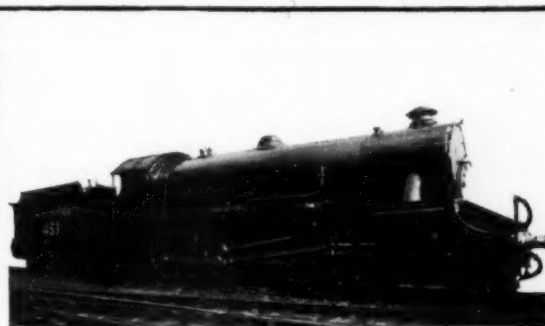
This railway will be of considerable importance in the development of Croatia and Dalmatia, and will greatly increase travel to the Dalmatian coast from Austria, Czechoslovakia, Hungary, and the other countries of eastern Europe. The journey from Zagreb to Split via Sisak now takes 22 hours and costs 680 dinars (second class by rail and first class by steamer), whereas

the journey on the Lika railway will take only 14 hours and cost 456 dinars for the same accommodations, a saving of 8 hours and 224 dinars. (The present value of the dinar is about 1½ cents.)

British Railway Advertising

The accompanying illustration is reproduced, slightly reduced, from the Times (London). It is typical of the kind of newspaper advertising being done by the British railways and is presented

SOUTHERN



"KING ARTHUR" CLASS.

Heavy Express Locomotive for Southern Railway. Cost £8,000. Weight, with Tender, 138 tons 3 cwt. Water capacity, 5,000 gallons. Coal capacity 5 tons. Driving wheels 6 feet 7 inches in diameter. Hauls 450-ton trains of 15 bogie coaches at 75 miles an hour.

91 New Engines this Summer



TWENTY locomotives similar to the one above are already in service on the Southern Railway. 46 more are being delivered—making 66 in all. These great engines are built to haul 450-ton trains at 75 miles an hour.

TEN will be allocated to the Dover and Folkestone Boat Trains—the remainder will work the fast expresses between London and Salisbury (non-stop), Exeter (one stop), Southampton (non-stop), Portsmouth (non-stop), and Bournemouth (one stop). They are among the biggest locomotives in the Country, and the last word in modern construction. In addition, 35 heavy "mixed traffic" engines, for use with passenger or freight trains, and 10 heavy tank locomotives are shortly to be delivered. All of these ninety-one new engines, costing over £600,000, will be in service this summer—there are more to follow.



SOUTHERN RAILWAY
actively engaged in the Public Service

H. A. WALKER, GENERAL MANAGER

E 7/25.

here as an illustration of the close similarity between typical British practice in this work and the typical practice of American railways along the same lines. The photograph of the locomotive shown here is a slightly different view from that shown in the Times.

Agreement for State Purchase of South African Private Line

If the agreement recently arrived at between the South African government and the board of the New Cape Central Railway Company for the acquisition of that railway be ratified by the shareholders and the Union Parliament, the way will be cleared for an important improvement in the trunk communications of the Cape Province, according to the Times (London) Trade Supplement.

The New Cape Central Railway Company owns the line connecting Worcester, on the main line from Cape Town to the north, with Mossel Bay, a distance of 205 miles, and this railway is the only privately-owned line in the Union which is of more than local significance. It forms the central link in the through route from Cape Town to Port Elizabeth. The fact that this railway did not form part of the state system has prevented the completion of a shorter parallel route from Cape Town to Port Elizabeth via Caledon, but an extension of 23 miles from the terminus at Protom (the name is sufficiently suggestive) to Swellendam, linking up the Caledon line with the existing through route at the latter point, will shorten the distance between the two Cape ports by 29 miles and the mileage from Cape Town to Mossel Bay will be contracted to the same extent.

It will also become possible to connect the termini of the Dwyka-Ladysmith and Oudtshoorn-Calitzdorp branches, now under construction, and so provide another through link between the Western and Midland main lines in the Cape Province.

Chinese Roads Earn Less in 1924

PEKING.

The Ministry of Communications has made public the approximate financial returns of the Chinese Government Railways for the year 1924. The totals with increases and decreases compared with 1923 are as follows:

| | | |
|----------------------------|---------------|----------------------|
| Operating Revenues | \$118,300,000 | \$1,100,000 decrease |
| Operating Expenses | 68,360,000 | 3,635,000 increase |
| Net Operating Revenue..... | 49,930,000 | 4,735,000 decrease |
| Income Debits | 26,600,000 | 4,389,000 increase |
| (Interest, etc.) | | |
| Income Credits | 2,334,000 | 530,000 increase |
| Surplus for the year..... | \$25,664,000 | \$8,587,000 decrease |

The actual cash position of the government railways will be very much worse than this statement appears, for the 1923 figures contained only some \$4,000,000 for military and other government service revenue, while those for 1924 undoubtedly contain as much as \$12,000,000. Hence the decrease in commercial business without much doubt will reach somewhere about \$16,000,000 and may be as much as \$20,000,000. The lines to show increases were the Shantung Railway with an increase of \$1,200,000, or about 14 per cent, the Ssu-Tao (in Manchuria) with an increase of \$1,100,000, or about 44 per cent with smaller increases on the Peking-Suiyuan, the Taokow-Chinghua and the Hupeh-Hunan (Hukuang) line.

The Lung-Hai failed to show its expected increase. The large decreases were on the three big lines; the Peking-Hankow, \$2,000,000; Peking-Mukden, \$1,350,000, and the Tientsin-Pukow, \$1,000,000.

During the past few days practically no coal or food have reached Peking over the Peking-Mukden line, due, it is said, to a concentration of rolling stock on the Manchurian section of the line for transportation of troops to the neighborhood of Peking. This is interpreted by the alarmists as the preliminary move to an attack on Feng Yu-hsiang. By others it is interpreted as the mere occupation of Chihli by Chang Tso-lin's forces as a result of the voluntary evacuation by Feng's lieutenant, Sun Yueh, who recently accepted a position in Honan. At the same time, the Tientsin-Pukow commercial traffic has been suspended, virtually, by troop movements under Chang Tsung-chang (Chang Tso-lin's lieutenant, who captured Shanghai), who has been given the province of Shantung. Thus a consolidation of the Manchurian forces in the northern portion of the Coastal plain is being effected, which, if executed without precipitating another general outbreak, should have a strong stabilizing influence.

Tang-Wen-kao, Chang Tso-lin's time-honored representative as managing director of the Peking-Mukden, has been induced to resign and in his place has been appointed Tseng Yin-huai. This is a personal victory for the Minister of Communications, Yeh Kung-cho, and his ideas of efficiency. From the old Chinese standpoint, Tang was a most admirable character, faithful to his friends, of whom he appointed some 300 to sinecure posts on the railway. The new appointee has been provost-martial to the troops in the railway territory since December and has taken an energetic part in restoring discipline and inaugurating certain improvements in the conduct of railway affairs where they came in contact with the military.

The rivalry of Japan and Russia is again taking on pre-war aspects. More or less with the connivance of the Manchurian authorities, the South Manchurian line has begun the extension of the Ssu-Tao branch towards Tsitsihar, a station on the Chinese Eastern about midway between Harbin and the western border of Manchuria. This is a logical extension of the Ssu-Tao and a natural step in the rivalry between Dairen and Vladivostok. The Russian ambassador refused to begin the Sino-Russian negotiations on May 1, the date fixed, pending the acceptance by the Chinese of his demand that the work of the Japanese on this Ssu-Tao extension be stopped. If the Chinese acquiesce in this demand, by so doing they will cast aside the weapon by which they might influence the Russians to alter the status of the Chinese Eastern to something more like that of the Shantung Railway under the present regime. There is some reason to believe that the Chinese are beginning to feel that they have less to fear from the Japanese than they have from the Russians. The promised benevolent attitude of the Soviet government has resulted in greater dismissal of Chinese employees than Russians, the raising of a tariff mountain at Changchun to force the flow of traffic to Valadivostok, and the imposition of a new switching charge to firms renting railway property. This provoked retaliation in the form of a merchant's strike. At a recent meeting of the board of directors the Chinese president took occasion to denounce the address of the Russian general manager as a political speech, and it is a curious co-incidence that during the past fortnight all but one of the Chinese assistant-chiefs of departments have been visiting Peking.



One of 20 Locomotives Built by the Baldwin Locomotive Works to the Central of New Jersey's Specifications—Total Weight in Working Order, Engine Only, 340,510 lb.—Tractive Force, 63,000 lb.

Equipment and Supplies

Locomotives

THE NEW YORK, NEW HAVEN & HARTFORD will build 10 locomotives in its own shops.

THE E. DE F. SAO PAULO RIO GRANDE, Brazil, has ordered 24 Mikado type locomotives from the Baldwin Locomotive Works.

Freight Cars

THE SOUTHERN is inquiring for 1,000 center sill reinforcements.

THE CUBA CANE SUGAR CORPORATION is inquiring for 50 cane cars.

MADEIRA, HILL & Co. has ordered seven 30-yd. extension side dump cars from the Clark Car Company.

THE CITIES SERVICE COMPANY, New York, has ordered 75 tank cars from the Standard Tank Car Company.

THE GREAT NORTHERN is inquiring for 1,000 steel underframes complete for 40 ft. box cars, of 40 tons' capacity.

THE GENERAL ELECTRIC COMPANY has ordered two 30-yd. extension side dump cars from the Clark Car Company.

THE LIVE POULTRY TRANSIT COMPANY has ordered 50 poultry cars from the Illinois Car & Manufacturing Company.

THE UNITED STATES NAVY DEPARTMENT has ordered one hopper car of 55 tons' capacity from the Pressed Steel Car Company.

THE TENNESSEE COAL, IRON & RAILROAD COMPANY has ordered five 30-yd. extension side dump cars from the Clark Car Company.

THE BUFFALO, ROCHESTER & PITTSBURGH has given a contract for the repair of 300 hopper cars to the Buffalo Steel Car Company.

THE MATHIESON ALKALI WORKS has ordered from the American Car & Foundry Company 10 tank cars of 50 tons' and 8,000 gal. capacity.

THE ANDREWS STEEL COMPANY is inquiring for from 5 to 10 flat cars of 100 tons' capacity; from 5 to 10 gondola cars of 75 tons' capacity and from 5 to 10 hopper cars of 55 tons' capacity.

Passenger Cars

THE BOSTON & ALBANY has ordered 20 suburban coaches 70 ft. 4 in. long, from the Osgood Bradley Car Company.

THE ST. LOUIS-SAN FRANCISCO has ordered two gasoline motor coaches for use in Oklahoma from the Sykes Company.

Iron and Steel

THE SOUTH AFRICAN RAILWAYS have recently placed orders for 25,000 tons of rail in England and for 19,000 tons with the La Provincia Company in Luxemburg. These roads are inquiring for an additional 100,000 tons of rail.

THE SOUTHERN has ordered 27,300 tons of rail, of which 23,200 tons were placed with the Tennessee Coal, Iron & Railroad Company and the remainder divided between the Bethlehem Steel Corporation and the Illinois Steel Company.

Machinery and Tools

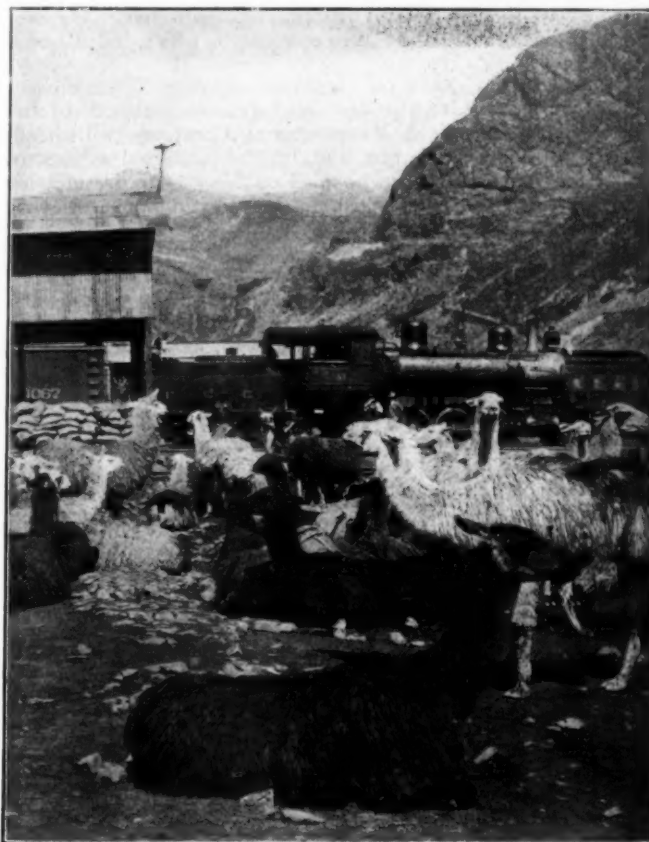
THE UNION PACIFIC has placed an order for a 1,500-lb. steam drop hammer.

THE DELAWARE, LACKAWANNA & WESTERN has ordered one 12-ton locomotive crane from the McMyler Interstate Company.

THE ATCHISON, TOPEKA & SANTA FE is inquiring for one 2-in. double head bolt cutter. This company has ordered one standard ditcher from the American Hoist & Derrick Company.

THE CHICAGO, BURLINGTON & QUINCY is inquiring for one triple head bolt threader; one 32-in. shaper; two upright drills; one 24-in. geared head engine lathe; one 54-in. vertical turret lathe and one power bending roll.

THE CHICAGO, ROCK ISLAND & PACIFIC is inquiring for one 4-spindle drill. The company has placed orders for the following machine tools: An axle lathe; 44-in. single head boring mill; 46-in. horizontal boring and drilling machine; 36-in. by 12-ft. planer; 5-ft. radial drill and a 300-ton wheel press.



Ewing Galloway

Station at Morococha on Central of Peru

LOCOMOTIVE REPAIR SITUATION

| Date, 1924 | No. locomotives on line | No. serviceable | No. stored serviceable | No. req. classified repairs | Per cent | No. req. running repairs | Per cent | Total req. repairs | Per cent |
|-----------------|-------------------------|-----------------|------------------------|-----------------------------|----------|--------------------------|----------|--------------------|----------|
| February 1 | 64,377 | 53,586 | 4,116 | 5,919 | 9.2 | 4,872 | 7.6 | 10,791 | 16.8 |
| April 1 | 64,363 | 52,805 | 4,648 | 6,128 | 9.5 | 5,430 | 8.4 | 11,558 | 17.9 |
| July 1 | 64,416 | 53,382 | 7,117 | 6,035 | 9.4 | 4,999 | 7.7 | 11,034 | 17.1 |
| October 1 | 64,538 | 53,209 | 5,424 | 6,175 | 9.6 | 5,154 | 8.0 | 11,329 | 17.6 |
| January 1, 1925 | 64,384 | 53,118 | 4,849 | 5,927 | 9.2 | 5,339 | 8.3 | 11,266 | 17.5 |
| February 1 | 64,308 | 52,994 | 4,220 | 6,143 | 9.6 | 5,171 | 8.0 | 11,314 | 17.6 |
| March 1 | 64,255 | 52,851 | 4,988 | 6,217 | 9.7 | 5,187 | 8.0 | 11,404 | 17.7 |
| April 1 | 64,230 | 52,619 | 6,241 | 6,345 | 9.9 | 5,266 | 8.2 | 11,611 | 18.1 |
| May 1 | 64,034 | 52,933 | 6,697 | 6,082 | 9.5 | 5,019 | 7.8 | 11,101 | 17.3 |

Data from Car Service Division reports.

Supply Trade News

The Northwest Engineering Company has moved its St. Louis office to 312 Buder building.

J. M. Davis, president of Manning, Maxwell & Moore, New York, has resigned to become president of the Delaware, Lackawanna & Western.

O. B. Chandler has been appointed sales manager of the supply distribution branch house of the Western Electric Company at Memphis, Tenn., to succeed E. P. McGrath, who has been transferred to the supply distributing house at New York.

J. W. Cane & Company, Houston, Tex., have been appointed southwestern representative of the Chicago Railway Equipment Company, the Scullin Steel Company, Mudge & Company, the Globe Steel Tubes Company and the Vulcan Iron Works.

Gunner R. Lundane, formerly manager of the New York office of the Black & Decker Manufacturing Company, has resigned to join the United States Electrical Tool Company, Cincinnati, Ohio, as special eastern representative. He will have his headquarters at the company's office, 50 Church street, New York City.

F. A. Merrick, vice-president and general manager of the Westinghouse Electric & Manufacturing Company, with headquarters at East Pittsburgh, Pa., has been elected a director to succeed A. G. Becker, who died on May 14. Mr. Merrick also was elected to the board of the Westinghouse Electric International Company.

E. I. du Pont de Nemours & Company, Wilmington, Del., have consolidated the eastern and western railway sales departments and P. G. Kennett, manager of the paint and varnish department, with headquarters in Chicago, has been appointed manager of railway sales, with headquarters in Chicago and New York. A. V. Marti, assistant to the sales manager, with headquarters in Chicago, has been appointed assistant manager of railway sales, with the same headquarters. Harvey Spangenberg, chief clerk to the sales manager, with headquarters at Philadelphia, Pa., has been appointed assistant to the manager of railway sales, with headquarters at Parlin, New Jersey.

May Shipments of Locomotives

The Department of Commerce has made public the locomotive shipments from principal establishments for May as follows:

| Year and month | Shipments | | | Unfilled orders end of month | | |
|---------------------|-----------|----------|---------|------------------------------|----------|---------|
| | Total | Domestic | Foreign | Total | Domestic | Foreign |
| 1923 | | | | | | |
| January | 229 | 217 | 12 | 1,788 | 1,699 | 89 |
| February | 207 | 196 | 11 | 2,220 | 2,141 | 79 |
| March | 232 | 269 | 13 | 2,316 | 2,214 | 102 |
| April | 217 | 201 | 16 | 2,204 | 2,111 | 93 |
| May | 238 | 228 | 10 | 2,150 | 2,045 | 105 |
| Total 5 months..... | 1,173 | 1,111 | 62 | ... | ... | ... |
| 1924 | | | | | | |
| January | 151 | 147 | 4 | 376 | 344 | 32 |
| February | 99 | 92 | 7 | 499 | 466 | 33 |
| March | 132 | 128 | 4 | 534 | 494 | 40 |
| April | 73 | 63 | 10 | 640 | 586 | 54 |
| May | 111 | 93 | 18 | 643 | 589 | 54 |
| Total 5 months..... | 566 | 523 | 43 | ... | ... | ... |
| 1925 | | | | | | |
| January | 90 | 45 | 45 | 407 | 351 | 56 |
| February | 85 | 73 | 12 | 397 | 343 | 54 |
| March | 109 | 93 | 16 | 447 | 351 | 96 |
| April | 92 | 82 | 10 | 477 | 362 | 115 |
| May | 96 | 68 | 28 | 467 | 353 | 114 |
| Total 5 months..... | 472 | 361 | 111 | ... | ... | ... |

Railway Construction

ATLANTIC COAST LINE.—A contract has been awarded to Hugger Brothers, Montgomery, Ala., for the construction of shop buildings at Uceta, Fla., to cost approximately \$180,000.

ATLANTIC COAST LINE.—A contract has been awarded to Gus Ginn, Gastonia, S. C., for the construction of several miles of passing tracks near Montgomery, Ala. The project involves the excavation of approximately 200,000 yd. of earth.

CANADIAN PACIFIC.—A contract has been awarded to the Manitoba Bridge Company, Winnipeg, Man., for the erection of a 100,000-gal. steel water tank at Eagle River, Man., and a tank of the same size at Molson, Man. A contract has been awarded to the Horton Steel Company, Bridgeburg, Ont., for the erection of a 100,000-gal. steel water tank at Souris, a similar tank at Broadview, and for an 80,000-gal. water tank at Elkhorn.

CHESAPEAKE & OHIO.—This company has authorized the acquisition of right of way and grading for 4.3 miles of second main track from Harts, W. Va., to Big Creek; estimated cost, \$120,000.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Bids will soon be taken for the construction of second track between Pana, Ill., and Mattoon, a distance of 60 miles. Plans have been completed.

FT. WORTH & DENVER CITY.—A freight terminal, including a freight station, a warehouse and a classification yard, will be constructed at Dallas, Tex., within a year, pursuant to the company's recent securing of entrance to that city by trackage rights.

JEFFERSON & NORTHWESTERN.—This company has applied to the Interstate Commerce Commission for authority for an extension from Marietta to Naples, Tex.

KANSAS CITY TERMINAL.—A contract has been awarded for the construction of a brick and concrete stores building in Kansas City, Mo., to cost approximately \$35,000.

LOUISVILLE & NASHVILLE.—The Interstate Commerce Commission has extended from June 3, 1925, to December 31, 1925, the time limit within which this company must file its application for the construction of a line connecting its McRoberts line and its Harlan county branch with the Carolina, Clinchfield & Ohio, under the terms of the commission's order permitting the lease of the Clinchfield by the L. & N. and the Atlantic Coast Line.

MISSOURI PACIFIC.—Plans are being prepared for the construction of a 15-stall roundhouse and a car repair shop at El Dorado, Ark.

MISSOURI PACIFIC.—A contract has been awarded to the Kellerman Contracting Company, St. Louis, Mo., for the construction of a 10-stall, reinforced concrete and brick roundhouse at St. Louis, Mo., to cost \$90,000, as reported in the *Railway Age* of May 23.

NEW YORK CENTRAL.—A contract for the elimination of a grade crossing at Main Street, Suspension Bridge, N. Y., to cost approximately \$318,000, has been awarded to the Walsh Construction Company, Davenport, Iowa. The Edward J. Duffy Co., Inc., Weehawken, N. J., has a contract for the extension of an arch culvert at Dunsbach Ferry, N. Y., to cost approximately \$25,400. A contract has been awarded to the Heine Boiler Company, Inc., New York, for the furnishing, delivery and erection of three 500-bhp. water-tube boilers at the company's 161st street boiler plant, Mott Haven, New York City; estimated cost, \$42,620.

NEW YORK, NEW HAVEN & HARTFORD.—The company has authorized the construction of a new classification yard at Worcester, Mass., the addition of a number of tracks to its classification yard at Cedar Hill (New Haven) Conn., and grading in connection with additional tracks to be laid in its Harlem river freight yard, New York City.

READING.—A contract has been awarded to the Curtis-Grindrod Company, Philadelphia, Pa., covering the construction of tunnels, platforms, shelters, stairways, etc., in connection with the new union station at Bethlehem, Pa.

SOUTHERN PACIFIC.—The application for permission for the San Antonio & Aransas Pass, a subsidiary, to construct an extension from Falfurrias, Texas, to the international boundary line at a point on the Rio Grande, reported in the *Railway Age* of May 16, includes also provision for the construction of a bridge across the Rio Grande at Hidalgo, Texas, connecting in Mexico with a branch line of the National Railways of Mexico.

ST. LOUIS-KANSAS CITY SHORT LINE.—*Electric.*—The Missouri Public Service Commission has denied an application of this company, reported in the *Railway Age* of February 21, for permission to construct a double-track electric interurban line between St. Louis, Mo., and Kansas City. Permission was refused on the ground that the financial ability of the company to pay the cost of constructing and operating the proposed line had not been established.

Rock Island to Spend \$20,000,000

Twenty million dollars will be spent by the Chicago, Rock Island & Pacific during the current year for additions and improvements to its line and equipment. The program provides for 42 miles of second track in Kansas, to cost \$3,700,000; a 33-mile branch line in Oklahoma to cost \$990,000; coal and water facilities at various points in Iowa to cost \$1,000,000, and improvements on the El Paso division, including a passenger station, at Tucumcari, N. M., to cost a total of \$310,000. The total expenditure of \$8,600,000 will be made in the laying of new rail, track elevation, elimination of grade crossings, and for shop machinery and improvements to locomotives and cars. New locomotives and cars to the amount of \$5,100,000 will be purchased, and \$2,230,000 has been appropriated for the rebuilding of refrigerator and coal cars. Orders for equipment authorized have already been placed, and part of the other work has been completed or is in progress, as reported in various earlier issues of the *Railway Age*.

Atlantic Coast Line to Spend \$10,500,000

The Atlantic Coast Line has authorized the expenditure this year of about \$10,500,000 for betterments to its transportation facilities. This includes the cost of completing double track on the main line between Richmond and Jacksonville which will be finished in the autumn of 1925, and will bring the amount spent or authorized for improved facilities since the end of federal control up to approximately \$66,500,000. The improvements to be made this year include the extension of many sidings, the construction of additional team and industrial tracks, enlarged yard and shop facilities at a number of important points, new coaling and water stations, the purchase of 60 new locomotives, 500 steel underframe 40-ton box cars, and 200 fifty-ton all steel phosphate cars, together with other miscellaneous rolling stock, and 55 thousand tons of 100-lb. rail.

At Tampa, Fla., over \$500,000 will be spent in constructing new shops and terminals. In the future all freight and passenger trains, except those bound for Port Tampa, 10 miles to the west, will be handled at the new Ucita terminals. The transportation and classification yard will include about 10 miles of track with capacity for 610 cars and room for expansion to accommodate at least three times this number. There will also be erected a 12-stall roundhouse, a machine shop, storehouse, blacksmith shop, 500-ton coaling plant, a cinder hoist, water softening plant, 100-ft. turntable, coach washing tracks and various other facilities. Work is actively under way on this project.

Other major items which have been authorized include the deepening of the channels at water terminals at Jacksonville and Port Tampa, new coaling stations at Collier, Va., Fayetteville, N. C., and Trilby, Fla., and the installation of telephone service for use in train dispatching between Jacksonville and Port Tampa and between Lakeland and High Springs, Fla., and reconstruction of an important interlocking plant at Ashley Junction. Extensive additions are to be made to existing shop facilities at Lakeland, Fla., Waycross and Albany, Ga., Montgomery, Ala., Florence, S. C., and Rocky Mount, N. C., and a salvage plant is to be established at Southover Shops, Savannah, Ga. The total cost of improvements to mechanical facilities will be more than \$800,000. Enough 100-lb. steel rail to relay about 370 miles of line has been ordered. At Thomasville, Ga., Montgomery, Ala., and Lakeland, Fla., 100-ft. modern turntables will be installed. A water softening plant will be erected at Moncrief Shops, Jacksonville, Fla.

Railway Financial News

ABILENE & SOUTHERN.—*Tentative Valuation.*—The Interstate Commerce Commission has issued a tentative valuation report as of 1918, finding the final value for rate-making purposes of the property owned to be \$830,577.

ANN ARBOR.—*Sold to Wabash.*—J. E. Taussig, president of the Wabash, has confirmed the report that the Ann Arbor has been sold to the Wabash. The sale is subject to the approval of the Interstate Commerce Commission. See *Railway Age*, of May 23, 1925, page 1302.

BONHOMIE & HATTIESBURG SOUTHERN.—*Authorized to Issue Securities.*—The Interstate Commerce Commission has granted this company authority to issue \$100,000 capital stock and \$235,000 first mortgage 6 per cent bonds to be delivered to W. S. F. Tatum in payment for the line of railroad recently purchased by him from the Gulf, Mobile & Northern extending from Beaumont, Miss., to Hattiesburg.

CAROLINA WESTERN.—*Certificate Issued.*—The Interstate Commerce Commission has issued a certificate of public convenience and necessity authorizing this company to operate a line from St. Stephens, S. C., to Halls, 6 miles.

CENTRAL INDIANA.—*Tentative Valuation.*—The Interstate Commerce Commission has served a tentative valuation report as of 1917 finding the final value for rate-making purposes of the property owned to be \$1,904,560.

CHICAGO & EASTERN ILLINOIS.—*New Directors.*—W. C. Potter and Joseph R. Swan, both officers of the Guaranty Trust Company of New York, have been elected directors of the Chicago & Eastern Illinois, succeeding W. H. McCarthy and Edward W. Winters.

CINCINNATI, INDIANAPOLIS & WESTERN.—*1924 Earnings.*—Annual report for 1924 shows net income after charges of \$92,195 as compared with \$97,777 in 1923. Selected items from the income statement follow:

| CINCINNATI, INDIANAPOLIS & WESTERN | | | |
|--|-------------|-------------|----------------------|
| | 1924 | 1923 | Increase or decrease |
| Railway operating revenues | \$4,520,729 | \$4,629,344 | —\$108,615 |
| Total operating expenses | \$3,780,199 | \$3,870,014 | —\$89,815 |
| Net revenue from operations | \$740,530 | \$759,331 | —\$18,800 |
| Railway tax accruals | 228,214 | 238,175 | —9,961 |
| Railway operating income | \$511,801 | \$521,151 | —\$9,350 |
| Equipment rents, dr. | \$38,843 | \$66,802 | —\$27,959 |
| Joint facility rents, dr. | 164,148 | 161,478 | 2,670 |
| Net railway operating income | \$308,810 | \$292,871 | \$15,939 |
| Non-operating income | 22,186 | 49,461 | —27,275 |
| Gross income | \$330,996 | \$342,331 | —\$11,336 |
| Rent for leased roads | \$1,310 | \$1,201 | \$109 |
| Interest on funded debt | 226,254 | 231,554 | 5,300 |
| Total deductions from gross income | \$238,800 | \$244,554 | —\$5,754 |
| Net income | \$92,195 | \$97,777 | —\$5,581 |

CHICAGO, MILWAUKEE & ST. PAUL.—*Reaction to Reorganization Plan.*—J. D. Shatford, chairman of the Railroad Owners' Association, an organization of railroad stockholders, is quoted in opposition to the reorganization plan as follows:

"I believe, that the great majority of stockholders will not agree to assessment on their stock to pay a Government loan of \$55,000,000 which will not fall due for from two to five years, and especially when it can be renewed. Furthermore, at the next session of Congress, the interest on this sum can probably be reduced from 6 to 4½ per cent. Why pay it off at 6 per cent?"

"The stockholders to whom I have talked want a fair reorganization and justice to those who are not able to pay the assessment required. They fear that under this plan their equities will be wiped out, which they do not regard as fair and just."

"It is proposed that the Government loan be paid off so that \$18,000,000 of mortgage bonds may be released, and used for further capital requirements. Long before the road went into receivership, these bonds could have been released by exchanging them for general and refunding obligations, but the directors and officers of the road made no attempt to do so."

"My information is that such a step would be successful at the present time, if those in charge saw fit to make the attempt."

Advises Against Acceptance.—Roosevelt & Son of New York, published advertisements last week advising against depositing securities under the proposed plan of reorganization. The firm states its opinion that the St. Paul is efficiently and economically operated, that it is moderately bonded and moderately capitalized but that the poor earnings are due to the rate structure. It is noted that the Interstate Commerce Commission is considering the rate structure at the present time. The statement says that "No reorganization should be consummated until the pending rate applications have been decided and every effort to obtain fair rates has been made. With fair rates the bondholders would not have to make the heavy sacrifices required by the published plan, and stockholders would not be required to pay so burdensome an assessment as the price of preserving their equity."

Figures given make a comparison as between the St. Paul and four other roads, namely, the Atlantic Coast Line, the Southern, the St. Louis-San Francisco and the Missouri-Kansas-Texas. The comparison follows:

| 1924 | St. Paul | Average 4 other roads | Difference | St. Paul's superiority Per cent. |
|---|----------|-----------------------------|------------|--|
| Bonded debt per 1000 ton-miles.. | \$42.00 | \$49.00 | \$7.00 | 14 |
| Capitalization per 1000 ton-miles. | 63.00 | 70.00 | 7.00 | 10 |
| Transportation costs—Direct cost of Tr. and Eng. service per 1000 ton-miles | 2.14 | 2.71 | 0.57 | 21 |
| Average revenue per ton mile, cents | 1.091 | 1.380 | 0.289 | 21* |

*St. Paul inferiority

Lisman Favors Plan.—F. J. Lisman of F. J. Lisman & Co., has expressed himself as being in favor of the plan as follows:

"Objections to the plan by the holders of junior bonds and stocks are:

"1. That the Government loan should not be paid in cash, when it might and ought to have been willing to fund its loan at a lower rate of interest for a long period, thus obviating the necessity of raising a very large amount of money at this time.

"2. That the road should not be reorganized at this time when, by keeping the property in the hands of receivers for a year or two, a much more favorable plan might have been possible, because it is expected that by that time the Interstate Commerce Commission will comply with its duties, as defined under the Transportation act of 1920—that is, that the commission will authorize a rate structure which will enable the railroads in the Northwestern States to earn a return of 5½ per cent. on their fair value.

"The bondholders object to giving to the stockholders for the assessment \$60,000,000 of bonds which are permanently a prior lien to the security which the old bondholders receive. They think the stockholders should have received either income adjustment bonds or preferred stock for the new money.

"The preferred and common stockholders object to the fact that they have to pay such a heavy assessment, for which they do not get a security which is worth par at this time. For \$4 of the assessment of one-eighth or one-seventh respectively, which the stockholders are asked to pay, they will receive a new security. This aggregates \$10,000,000 for which they would like to get something. Substantially all of this \$10,000,000 is necessary to pay reorganization expenses and to make good deferred maintenance. Neither of these items should be capitalized.

"The preferred stockholder objects to the fact that his preference ahead of the common stock has been reduced from 7 per cent. to 5 per cent.

"The common stockholders object to the fact that they are expected to pay a larger assessment than the preferred stockholders and that they get a stock so far remote from the property which, according to the experts' reports, even ten years hence will not be earning a dividend.

"There is more or less force to all these objections.

"We are naturally inclined to take the bondholders' point of view. The bondholder, who is not receiving either principal or interest on his bonds, is entitled to the entire equity. This equity is now greatly attenuated unless new money is furnished. Therefore, the question is, Does the stockholder furnish the new money on the best possible terms to the bondholder, or does he not?

"If the bondholders are in a position to organize a syndicate which will underwrite the \$70,000,000 assessment on the stock and give the stockholder only adjustment bonds to the extent of 60 per cent of the new money and stocks for the rest, then the proposed plan is not a fair one. Unless the bondholders are prepared to do this, they should not object to the plan.

"Stockholders simply do not like to pay assessments, but we think the plan as a whole is very favorable to them, though the earnings would have to increase tremendously before the common stock is in sight of any dividends.

"The net earnings for 1925 are estimated at \$17,640,000.

"Interest charges of the new company before issuing additional securities for betterments and improvements are \$11,467,000.

"Allowing \$2,500,000 for betterments to be paid out of earnings there would be left \$3,600,000 applicable to interest on adjustment bonds or about 1.55 per cent.

"Net earnings would have to increase by about \$16,000,000 to about \$33,000,000 before full 5 per cent. dividends can be shown as earned on the preferred stock. No doubt the net earnings would have to be fully \$35,000,000 before the directors would be justified in declaring 5 per cent. dividends on the preferred stock, because the average fixed charges during

the next five years will increase, if the bonds can be sold on a 5½ per cent. basis, by an average of about \$480,000 per annum or \$2,400,000 in five years. Furthermore, in 1930 the company will have to set aside annually \$1,150,000 for a sinking fund on the income bonds."

Railroad Administration May Not Accept Offer of Reorganization Plan.—Director General Davis, of the Railroad Administration, has not indicated definitely whether or not he would accept either of the two alternative offers included in the reorganization plan for the payment of the \$20,000,000 6 per cent note representing the indebtedness of the company for the period of federal control, but it is understood that he is inclined to take the position that it should be paid in full with interest in cash. The plan provides for paying the \$35,000,000 loan made by the Interstate Commerce Commission, which is in the hands of the Treasury Department, in full in cash, but for the note to the director general it proposes to pay either \$17,000,000 in cash and \$3,000,000 in new preferred stock, or \$32,000,000 in new 5 per cent adjustment mortgage bonds. The director general holds as collateral \$32,000,000 of refunding bonds, taken when their market price represented a margin of over 25 per cent. They have since sold as low as 45 but would have to go only to 62½ to equal the face of the note and the director general is understood to feel that the real value of the collateral is equal to the face of the note and that he should not be called upon to take less than par in cash, in view of the prospects of the road and the fact that the note is not due until 1930. The director general, however, is the agent of the President and it is stated that the government might be willing to accept a total of \$52,000,000 of cash and the balance in preferred stock as against the total indebtedness to it of \$55,000,000.

COWLITZ, CHEHALIS & CASCADE.—*Authorized to Issue Bonds.* The Interstate Commerce Commission has authorized this company to issue \$729,000 6 per cent general and refunding mortgage bonds, part to be used to retire bonds now outstanding and the remainder to be sold to connecting carriers to provide funds for an extension of the company's line.

DETROIT, CARO & SANDUSKY.—*Acquisition.*—This company has applied to the Interstate Commerce Commission for authority to acquire and operate the line from Caro to Roseburg, Mich., 50 miles, abandoned by the Detroit, Bay City & Western, which it proposes to purchase for \$400,000.

FT. WORTH & DENVER SOUTH PLAINS.—The offer of citizens of Lubbock, Tex., to donate \$175,000 and 82 acres of land in Lubbock to the Ft. Worth & Denver South Plains, a subsidiary of the Chicago, Burlington & Quincy, has been accepted. The railway plans to extend its line from Silverton, Texas, to Lubbock, in the near future, as reported in the *Railway Age* of April 18.

MAINE CENTRAL.—*Back Preferred Dividends Declared.*—Directors of the Maine Central Railroad have declared the regular quarterly dividend of \$1.25 a share on the preferred stock and \$2.50 per share on account of accruals. The former is payable June 1 to stock of record May 15 and the back dividend June 15 to stock of record May 29. The preferred stock is 5 per cent cumulative but dividends ceased in 1920. Last December payments were resumed at the regular rate. This extra declaration is the first payment on the accruals. It reduces the amount unpaid to \$17.50 per share.

MINNEAPOLIS & ST. LOUIS.—*Tentative Valuation.*—The Interstate Commerce Commission has issued a tentative valuation report as of June 30, 1917, in which the final value for rate-making purposes of the property owned is placed at \$46,944,428. The outstanding capitalization as of valuation date was \$71,294,300 and the investment in road and equipment was stated in the books as \$68,418,760, which the report readjusts to \$58,553,951.

MINNEAPOLIS & ST. LOUIS.—*Receiver's Certificates.*—The Interstate Commerce Commission has approved the issue of \$1,000,000 7 per cent receiver's certificates authorized by the court on May 16. The commission's decision said:

"The receiver is an officer of the court and is acting under its authority. While it is within our province to give our authority and consent under section 20a of the interstate commerce act, it is not to be understood that by giving such authority we pass upon or in any wise determine or affect the nature of the rights or liens to be enjoyed under the certificates or the priority of the certificates in their relation to other liens."

(Continued on page 1500)

Annual Report

Southern Railway Company—Thirty-First Annual Report

RICHMOND, VA., May 29, 1925.

To the Stockholders of

SOUTHERN RAILWAY COMPANY:

The Board of Directors submits the following report of the affairs of the Company for the year ended December 31, 1924:

Financial Results

The income account for the year 1924 was published on January 29, 1925. It is reproduced in detail as Table No. 1 in this report. The balance of income over fixed charges amounted to \$17,769,140, equivalent to 12.30% on the common stock after providing for the dividend on the preferred stock, compared with \$15,136,998, equivalent to 10.11% on the common stock, in the preceding year.

The gross operating revenue amounted to \$142,486,514 in 1924 compared with \$150,467,985 in 1923, a decrease of \$7,981,471 or 5.30%. Operating expenses were reduced \$9,739,584 or 8.66%. The ratio of operating expenses to gross revenue was 72.06%, compared with 74.71% in the preceding year. The net income from operation remaining after the payment of operating expenses, taxes and equipment and joint facility rentals was \$30,442,720, compared with \$28,128,137 in the preceding year.

The operating income in 1924 was equivalent to 5.04% on the investment in the property which produced the income.

Dividends at the rate of five per cent. per annum were paid on both classes of stock.

Operating Revenue

Freight.

The gross revenue on freight traffic in 1924 amounted to \$99,842,143 compared with \$105,439,499 in 1923, a decrease of \$5,597,356 or 5.31%.

The volume of freight traffic in 1924 was somewhat smaller than in 1923. The decline was due to a falling off in coal and lumber shipments. The tonnage of other manufactured products and of agricultural products carried was approximately the same as in the preceding year. In 1924 our trains hauled 42,750,281 tons of freight an average distance of 177.43 miles, producing 7,585,374,000 ton miles, in comparison with the preceding year's traffic of 45,573,936 tons hauled an average distance of 178.25 miles, producing 8,123,384,000 ton miles. The average revenue per ton per mile in 1924 was 1.316c, compared with 1.298c in 1923, the slight increase in this figure being due not to an increase in rates, which in fact tended to decline during the year, but to the handling of a relatively larger percentage of the higher classes of freight consequent upon the decline in the volume of coal and lumber traffic.

Passenger.

The gross revenue on passenger traffic in 1924 amounted to \$31,083,146 compared with \$33,756,011 in 1923, a decrease of \$2,672,865 or 7.92%.

Passenger business continued to display the characteristics of recent years. Automobile competition for local passenger travel increases with the extension of improved highways. On the other hand, the volume of through passenger travel continues to expand and to afford ample business justification for progressive improvement in through train service available to the long distance traveller.

Operating Expenses

The problem of controlling the expense account, without detriment to the property, confronted the management throughout a year of declining gross revenue. That the effort was successful is amply proven by the statistics which accompany this report.

Transportation.

The ratios of transportation expense to gross revenue, (i. e., the number of cents from each dollar of gross revenue expended for operating trains, stations and yards,—expenditures which produce nothing but transportation and which are to be distinguished from maintenance expenses in that they put nothing back into the property) during the five years succeeding Federal operation have been as follows:

| Year | Transportation Ratio |
|------|----------------------|
| 1924 | 35.13 |
| 1923 | 36.32 |
| 1922 | 39.50 |
| 1921 | 43.07 |
| 1920 | 46.07 |

The real improvement in 1924 is more substantial than the reduction of 3.28% below the ratio of 1923 would suggest. The amount actually expended for transportation expense in 1924 was \$50,056,191 compared with \$54,649,659 in 1923, a reduction of \$4,593,468 or 8.41%. The smaller percentage decrease in the ratio was due to the decline in gross, much of which was in passenger revenue without corresponding opportunity to reduce passenger train mileage. Some of the economies effected in transportation costs are reflected in the following table:

| | 1924 | 1923 | Increase | Decrease |
|---|--------|--------|----------|----------|
| Number of tons hauled per freight locomotive mile | 1,203 | 1,138 | 5.71% | |
| Number of gross ton miles per freight train hour (a unit reflecting improvement both in the loading and movement of freight cars) | 15,700 | 14,050 | 11.74% | |
| Wage cost of freight train crews per thousand gross ton miles (the economy here reflected having been effected notwithstanding increases in rates of pay effective March 1, 1924) | 35.09c | 37.63c | | 6.75% |
| Number of pounds of coal consumed in freight train locomotives per thousand gross ton miles | 204 | 229 | | 10.92% |
| Number of pounds of coal consumed in passenger train locomotives per passenger car mile | 18.6 | 20.2 | | 7.92% |

Maintenance.

The property has been fully maintained and is in good physical condition, both actually and comparatively.

The amount expended for maintenance of the roadbed and fixed structures in 1924 was \$19,566,826. This compares with \$20,680,326 in 1923 and with \$17,295,517 in 1922. Of each dollar of the 1924 expense account 19.05 cents was devoted to this purpose compared with 18.40 cents in 1923 and 17.80 cents in 1922.

A total of 3,110,937 new cross ties were placed in main line tracks. This compares with an average of 2,962,733 per annum over a ten-year period. The number of track miles of new steel rail laid in 1924 was 312. This compares with an average of 233 miles per annum over a ten-year period.

The amount expended for maintaining engines and cars in 1924 was \$25,511,591. This compares with \$29,251,199 in 1923 and with \$21,927,548 in 1922. Of each dollar of the 1924 expense account 24.85 cents was devoted to this purpose compared with 26.02 cents in 1923 and with 22.57 cents in 1922. This comparison is distorted by the consequences of the shopmen's strike in 1922, an influence of general application, as shown by the fact that while the Southern's maintenance of equipment expenditures in 1924 were 12.78% below those of 1923, the like expenditures in 1924 of all class one railroads in the United States averaged 13.80% below their 1923 expenditures. A better idea of the Southern's relative money expenditures for maintaining equipment can be obtained by comparing the year under review with the average of the two preceding years:

| | 1924 | 1923-1922 Average |
|---------------------------------------|--------------|-------------------|
| Maintenance of equipment expenditures | \$25,511,591 | \$25,589,373 |
| Per cent. of total operating expenses | 24.85% | 24.29% |
| Per cent. of gross revenue | 17.91% | 18.25% |

But the money figures do not tell the whole story. Old machinery in the shops was replaced during the year with modern machinery to an extent never before possible and this resulted in substantial reductions in the dollar cost of the same quantity of maintenance work. The number of locomotives classified as in bad order was substantially the same at the end of 1924 as twelve months previously, the record showing 229 on December 31, 1924, and 220 on December 31, 1923. The percentage of "bad order" freight cars to total cars owned increased during the year from 4.76% to 6.74%, but this increase was due largely to the setting aside during the latter part of 1924 of cars selected for rebuilding with steel underframes.

Hire of Equipment.

The hire of equipment account reflects the results of the policy of liberal purchases of new freight cars plus extraordinary efforts put forth by the operating staff to keep cars moving. In this account the net balances charged against the Southern during the last three years have been:

| | |
|------|-------------|
| 1922 | \$4,213,019 |
| 1923 | 2,042,237 |
| 1924 | 748,542 |

[ADVERTISEMENT]

Taxes.

There was no halt in the upward trend of taxes. The tax bill of the Southern was \$7,702,699 in 1924 compared with \$6,994,407 in 1923. This levy called for no less than 5.4c out of each dollar of the gross revenue of 1924, against 4.6c in 1923, a comparative increase of 17%. What this means is apparent in the fact that one-fifth of the net operating revenue was appropriated to government. In such a parlous situation the only comfort is that public sentiment seems to be now alive to the vital importance of so reducing governmental expenditures as to make possible relief from the current heavy burden of taxation.

Additions to the Property**Road and Structures.**

The improvement program for which financial provision was made by the issue in November, 1923, of \$20,000,000 Development and General Mortgage bonds was actively under way during 1924. A number of important projects were completed and placed in operation toward the close of the year, including a new locomotive and car repair shop at Birmingham, Ala., a new car repair shop at Spartanburg, S. C., a new roundhouse at Spencer, N. C., additions to the shop facilities at Princeton, Ind., electric automatic signals on the line between Atlanta, Ga., and Birmingham, Ala., and telephone train dispatching circuits between Atlanta and Birmingham and between Salisbury, N. C., and Knoxville, Tenn. Other major construction jobs nearing completion include a large classification yard, engine terminal and cut-off line at Knoxville, Tenn., additions to the yard and engine terminal facilities at Asheville, N. C., a new locomotive repair shop, engine terminal and coach yard at Atlanta, Ga., a three mile cut-off line at Spartanburg, S. C., and a seventeen mile cut-off line from Bulls Gap to Leadvale, Tenn.

Rolling Stock.

Fifty new locomotives, 41 new passenger train cars and 3,500 new freight cars contracted for in the autumn of 1924 have been delivered and placed in service. The cost of this equipment was \$8,843,350, which was paid partly from current treasury funds and the remainder from the sale of \$7,050,000 Series "Z" $4\frac{1}{2}\%$ equipment trust certificates dated October 1, 1924, payable in thirty equal semi-annual installments.

Industrial and Agricultural Development**Industrial.**

In the expansion and diversification of the manufacturing activities of the South during the last twenty years the Company has secured a steadily increasing volume of all classes of freight traffic with only such temporary interruptions in the upward trend as have followed lulls in the operations of individual industries. Expressed in tons of each general class of freight handled this growth is set forth in the following figures:

| | Year 1924 | Year 1904 | Increase |
|--|------------|------------|----------|
| Manufactured Products, including also all less than carload freight..... | 12,291,573 | 5,820,828 | 111% |
| Products of Mines..... | 18,009,314 | 8,568,471 | 110% |
| Products of Forests..... | 7,765,836 | 3,607,174 | 116% |
| Products of Agriculture..... | 4,232,224 | 2,450,732 | 73% |
| Products of Animals..... | 431,334 | 285,844 | 51% |
| Totals..... | 42,750,281 | 20,733,049 | 106% |

A noteworthy feature of this exhibit is the evidence it affords of the South's uniform development along all lines of economic endeavor. More and more every year Southern factories draw their raw materials from Southern farms, forests and mines.

Notwithstanding the fact that these two decades have witnessed the utilization on a large scale of the waterpower available throughout the southern Appalachian protaxis, the Company's coal traffic has doubled during the same period. A single central power plant located on the Southern during the past year is expected to use annually 400,000 tons of coal in the operation of steam driven generators which will produce electric energy sufficient to operate 300,000 cotton spindles.

An interesting feature of the cotton manufacturing industry in the South during the past year has been the extension westwardly of its field of intensive activity. A number of new cotton mills on the Company's rails in western North Carolina, eastern Tennessee and northern Georgia were under construction at the close of the year.

At the end of 1924 there were 17,359,420 cotton spindles in the South, constituting 45.82% of the cotton spinning machinery in the United States. During that year there was a net increase of 612,374 spindles in the South and a net decrease of 362,545 spindles in states outside of the South. The southern spindles operated 49,603,270,297 spindle hours, while the mills of all other states, with 20,526,118 spindles, operated 30,473,333,254 spindle hours. In other words, southern mills, with 45.82% of the total spindles in the United States, worked 61.94% of the total spindle hours in 1924.

Marked expansion has taken place in the cement industry in the South. One important plant, placed in operation only one year ago, already is being enlarged. Another new plant is being constructed and two others are in prospect for locations on the Company's lines within the near future.

The healthy growth of the southern iron and steel industry has been sustained. In the manufacture of finished steel and iron products the South now converts more than eighty per cent. of the production of southern iron.

Agricultural.

The distinct improvement in agricultural conditions in the territory along the Company's lines has been contributed to substantially by the work of the Company's field organization engaged in agricultural, horticultural, livestock and immigration work. This work takes the form of helpful suggestions concerning farm problems, including methods of cultivation, diversification and rotation of crops, protection from plant disease and insects, breeding and care of farm animals and marketing of farm products. The effort has been to do this job along practical lines, and, as examples of success, there may be cited the adoption, over a wide field and with excellent results, of suggestions concerning the cultivation of cotton under boll weevil conditions and the inauguration of tobacco growing in Georgia on a substantial scale.

Forestry.

The diminishing timber supply of the United States has forcibly directed attention to the importance of reforestation. On account of the longer growing seasons trees will grow far more rapidly in the South than in the colder regions of the North. In co-operation with the United States Forestry Service and the forestry officials of the various states the Southern is carrying on an educational campaign to emphasize the importance of reforestation to the nation as well as the value of farm woodlands as a source of income to the southern farmer. As a part of this campaign a large tract of land in South Carolina owned by the Company, better suited to the growth of pine trees than to any other use, has been devoted to a demonstration of the possibility of growing trees for profit.

To all officers and employees who have faithfully and efficiently performed their duties the thanks of the Board of Directors again are tendered.

Respectfully submitted, by order of the Board.

FAIRFAX HARRISON, President.

Table 1.—Income Statement

| | 1924. | 1923. |
|---|------------------|------------------|
| Operating Revenues: | | |
| Freight | \$99,842,143.47 | \$105,439,499.17 |
| Passenger | 31,083,146.48 | 33,756,011.37 |
| Miscellaneous Passenger-Train | 1,139,977.74 | 1,111,905.67 |
| Mail | 3,361,070.45 | 2,985,727.24 |
| Express | 2,616,730.50 | 2,652,890.25 |
| Other Transportation | 1,355,965.41 | 1,375,232.42 |
| Incidental | 2,239,477.33 | 2,387,089.75 |
| Joint Facility | 848,003.01 | 759,629.36 |
| Total Operating Revenues..... | \$142,486,514.39 | \$150,467,985.23 |
| Operating Expenses: | | |
| Maintenance of Way and Structures..... | \$19,556,826.06 | \$20,680,325.55 |
| Maintenance of Equipment..... | 25,511,591.11 | 29,251,199.43 |
| Traffic | 2,703,532.03 | 2,908,426.91 |
| Transportation | 50,056,191.50 | 54,649,659.19 |
| Miscellaneous Operations | 1,045,479.05 | 1,052,633.51 |
| General | 3,888,813.24 | 3,893,773.32 |
| Transportation for Investment—Credit.... | 87,758.57 | 21,759.24 |
| Total Operating Expenses..... | \$102,674,674.42 | \$112,414,258.67 |
| Net Revenue from Operations..... | \$39,811,839.97 | \$38,053,726.56 |
| Taxes | \$7,702,699.01 | \$6,994,407.26 |
| Uncollectible Revenues | 49,405.59 | 47,388.42 |
| Hire of Equipment..... | 748,542.46 | 2,042,236.94 |
| Joint Facility Rents..... | 868,473.09 | 841,557.10 |
| Total Other Expenses..... | \$9,369,120.15 | \$9,925,589.72 |
| Operating Income | \$30,442,719.82 | \$28,128,136.84 |
| Non-Operating Income: | | |
| Income from Lease of Road..... | \$64,003.33 | \$63,557.24 |
| Miscellaneous Rent Income..... | 282,753.97 | 268,822.49 |
| Miscellaneous Non-Operating Physical Property | 102,044.87 | 133,728.20 |
| Dividend Income | 1,747,377.42 | 1,565,674.80 |
| Income from Funded Securities..... | 1,370,865.83 | 938,815.80 |
| Income from Unfunded Securities and Accounts | 1,269,023.19 | 612,285.51 |
| Miscellaneous Income | 6,592.74 | 882.69 |
| Total Non-Operating Income..... | \$4,842,661.35 | \$3,584,166.73 |
| Total Gross Income..... | \$35,285,381.17 | \$31,712,303.57 |

[ADVERTISEMENT]

Deductions from Total Gross Income:

| | | |
|--|------------------------|------------------------|
| Rent for Leased Roads..... | \$2,775,403.11 | \$2,656,961.82 |
| Miscellaneous Rents | 31,533.64 | 31,285.86 |
| *Separately Operated Properties..... | | 543,124.06 |
| Interest on Unfunded Debt..... | 46,461.97 | 50,110.17 |
| Miscellaneous Income Charges..... | 186,648.94 | 158,654.97 |
| Total Deductions of This Class..... | \$3,040,047.66 | \$3,440,136.88 |
| Total Available Income..... | \$32,245,333.51 | \$28,272,166.69 |
| Interest on Funded Debt..... | \$12,747,775.84 | \$11,665,046.67 |
| Interest on Equipment Obligations..... | 1,502,409.59 | 1,244,113.80 |
| Dividend on Southern Railway—Mobile and Ohio Stock Trust Certificates..... | 226,008.00 | 226,008.00 |
| Total Deductions of This Class..... | \$14,476,193.43 | \$13,135,168.47 |
| Balance of Income Over Charges..... | \$17,769,140.08 | \$15,136,998.22 |
| Reserve for Dividends on Preferred Stock... | 3,000,000.06 | 3,000,090.00 |
| BALANCE CARRIED TO CREDIT OF PROFIT AND LOSS..... | \$14,769,140.08 | \$12,136,998.22 |

*This item in 1923 represented the expense to Southern Railway Company of the terminal facilities at New Orleans owned by New Orleans Terminal Company, the stock of which is owned and the bonds of which are guaranteed by the Southern. Since January 1, 1924, the New Orleans Terminal Company has received directly a proportion of the gross revenue on traffic handled over its facilities sufficient to support its operating expenses and fixed charges. The effect of this change in accounting in the year 1924 was to relieve the Southern's income account of this charge and correspondingly to reduce its gross revenue.

Table 2.—Profit and Loss

| | |
|--|-----------------|
| Credit Balance December 31, 1923..... | \$67,513,272.37 |
| Add: | |
| Credit Balance of Income for the Year..... | \$14,769,140.08 |
| Net Miscellaneous Credits..... | 160,514.93 |
| | 14,929,655.01 |
| | \$82,442,927.38 |
| Deduct: | |
| Dividend of 5% on Preferred Stock..... | \$3,000,000.00 |
| Dividend of 5% on Common Stock..... | 6,000,000.00 |
| Discount on Securities..... | 544,060.50 |
| Property Retired | 67,667.33 |
| | 9,611,727.83 |
| Credit Balance December 31, 1924..... | \$72,831,199.55 |

Table 3.—General Balance Sheet

| Assets | | Liabilities | |
|---|-------------------------|-------------------------|--------------------|
| | December 31, 1924. | December 31, 1923. | December 31, 1923. |
| Investments: | | | |
| Investment in Road..... | \$366,491,874.53 | \$354,066,936.39 | |
| Investment in Equipment..... | 118,511,949.60 | 107,712,631.53 | |
| Total Investment in Road and Equipment..... | \$485,003,824.13 | \$461,779,567.92 | |
| Funds Appropriated for Construction..... | \$7,592,968.75 | \$18,589,406.26 | |
| Proceeds from sale of Mortgaged Property, held by Trustees for Reinvestment..... | 4,975.00 | 684,147.31 | |
| Miscellaneous Physical Property..... | 1,002,704.38 | 1,010,020.05 | |
| INVESTMENTS IN AFFILIATED COMPANIES: | | | |
| Stocks | 35,129,200.73 | 35,147,261.75 | |
| Bonds | 24,710,970.19 | 24,935,973.19 | |
| Notes | 4,585,116.77 | 4,674,201.57 | |
| Advances | 3,153,937.71 | 2,731,681.16 | |
| Total Investments in Affiliated Companies..... | \$67,579,225.40 | \$67,489,117.67 | |
| OTHER INVESTMENTS: | | | |
| Stocks | \$93,808.00 | \$93,808.00 | |
| Bonds | 2,378,308.21 | 2,429,003.21 | |
| Notes | 17,342.79 | 120,892.79 | |
| Advances for Purchase of Additional Equipment | 6,286,850.00 | | |
| Total Other Investments..... | \$8,776,309.00 | \$2,643,704.00 | |
| Total Investments | \$569,960,006.66 | \$552,195,963.21 | |
| Current Assets: | | | |
| Cash | \$10,428,530.69 | \$9,975,262.26 | |
| United States Government Securities..... | 16,283,640.64 | 9,984,187.51 | |
| Special Deposits | 2,860,410.15 | 2,824,975.40 | |
| Loans and Bills Receivable | 22,268.16 | 34,967.92 | |
| Traffic and Car Service Balances Receivable | 1,531,010.43 | 1,765,847.49 | |
| Balances due from Agents and Conductors..... | 54,753.99 | 92,329.69 | |
| Miscellaneous Accounts Receivable..... | 6,181,070.04 | 6,375,645.69 | |
| Material and Supplies (Table II)..... | 11,379,189.29 | 17,194,734.59 | |
| Interest and Dividends Receivable..... | 787,797.86 | 632,555.55 | |
| Other Current Assets | 245,996.35 | 256,119.08 | |
| Total Current Assets | \$49,774,667.60 | \$49,136,625.18 | |
| Deferred Assets: | | | |
| Working Fund Advances..... | \$105,715.28 | \$72,402.43 | |
| Cash and Securities in Insurance Fund | 1,020,373.31 | 900,658.76 | |
| Cash Deposited under North Carolina Railroad Lease | 175,000.00 | 175,000.00 | |
| Other Deferred Assets..... | 212,416.73 | 172,823.67 | |
| Total Deferred Assets..... | \$1,513,505.32 | \$1,320,884.86 | |
| Unadjusted Debits: | | | |
| Insurance Premiums and Rents paid in Advance | \$2,410.62 | \$4,836.52 | |
| Additions and Betterments Expenditures: Freight Claims: Foreign Mileage and Sundry Items in Suspense..... | 4,218,132.99 | 4,015,467.86 | |
| Total Unadjusted Debits | \$4,220,543.61 | \$4,020,304.38 | |
| Securities of the Company held by it: | | | |
| 1924 | | | |
| Unpledged \$36,171,200.00 | \$31,171,200.00 | | |
| GRAND TOTALS | \$625,468,723.19 | \$606,673,777.63 | |
| [ADVERTISEMENT] | | | |
| Capital Stock: | | | |
| Common | \$120,000,000.00 | \$120,000,000.00 | |
| Preferred | 60,000,000.00 | 60,000,000.00 | |
| Total Southern Railway Company Stock..... | \$180,000,000.00 | \$180,000,000.00 | |
| Southern Ry.-Mobile & Ohio Stock Trust Certificates | \$5,650,200.00 | \$5,650,200.00 | |
| Long Term Debt: | | | |
| Funded Debt | \$259,213,500.00 | \$259,213,500.00 | |
| Equipment Trust Obligations..... | 36,528,200.00 | 26,049,400.00 | |
| Total Long Term Debt..... | \$295,741,700.00 | \$285,262,900.00 | |
| Total Capital Liabilities..... | \$481,391,900.00 | \$470,913,100.00 | |
| Governmental Grants: | | | |
| Grants since July 1, 1914, in aid of Construction | \$225,855.34 | \$214,150.34 | |
| Current Liabilities: | | | |
| Traffic and Car Service Balances Payable..... | \$1,620,079.11 | \$1,850,846.77 | |
| Audited Accounts and Wages Payable | 13,905,192.83 | 15,996,797.22 | |
| Miscellaneous Accounts Payable..... | 2,120,127.50 | 1,515,220.49 | |
| Interest Matured, including interest due January 1st | 2,830,032.10 | 2,794,118.60 | |
| Dividends Matured Unpaid | 4,076.25 | 1,625.00 | |
| Funded Debt Matured Unpaid..... | 26,651.80 | 29,581.80 | |
| Unmatured Dividends Accrued on Southern Ry.-Mobile & Ohio Stock Trust Certificates | 56,502.00 | 56,502.00 | |
| Unmatured Interest Accrued | 2,379,441.32 | 2,249,561.40 | |
| Unmatured Rents Accrued | 203,975.00 | 311,153.49 | |
| Expenses Accrued not vouchered..... | 1,514,767.71 | 2,058,378.57 | |
| Other Current Liabilities | 1,375,092.11 | 1,470,943.78 | |
| Total Current Liabilities..... | \$26,035,937.73 | \$28,334,729.12 | |
| Dividend Reserves | \$4,500,000.00 | | |
| Deferred Liabilities: | | | |
| Sundry Deferred Liabilities..... | \$2,656,014.23 | \$2,147,183.39 | |
| Unadjusted Credits: | | | |
| Taxes | \$2,011,856.58 | \$2,465,064.11 | |
| Insurance Reserve | 1,420,373.31 | 1,300,658.76 | |
| Operating Reserves | 1,198,616.98 | 1,199,542.16 | |
| Depreciation accrued on: | | | |
| Rail Leased to Other Companies..... | 143,269.72 | 129,776.08 | |
| Equipment Owned | 25,533,934.75 | 24,733,867.21 | |
| Equipment Leased from Other Companies | 533,211.56 | 570,205.15 | |
| Sundry Items | 4,026,113.10 | 4,111,933.14 | |
| Total Unadjusted Credits | \$34,867,376.00 | \$34,511,046.61 | |
| Corporate Surplus: | | | |
| Additions to Property, since June 30, 1907, through Income and Surplus | \$1,841,587.74 | \$1,812,075.89 | |
| Appropriated Surplus since January 1, 1921, for Nonproductive Capital Charges, required by Public Authorities | 1,118,852.60 | 1,206,626.73 | |
| Miscellaneous | | 21,593.18 | |
| Total Appropriated Surplus..... | \$2,960,440.34 | \$3,040,295.80 | |
| Profit and Loss—Balance..... | \$72,831,199.55 | \$67,513,272.37 | |
| GRAND TOTALS | \$625,468,723.19 | \$606,673,777.63 | |

General News Department

(Continued from page 1496)

MISSOURI & NORTH ARKANSAS.—Tentative Valuation.—The Interstate Commerce Commission has issued a tentative valuation report as of June 30, 1919, placing the final value for rate-making purposes of the property owned at \$9,177,460. The outstanding capitalization was \$18,674,000 and the investment in road and equipment \$18,131,278.

NEW YORK, CHICAGO & ST. LOUIS.—Answer to Intervening Petition in Unification Case.—J. J. Bernet, president, and W. A. Colston, general counsel, have filed with the Interstate Commerce Commission answers and objections to the intervening petition filed in the unification case by the Scott protective committee. The answers deny the allegations of the petition which led up to a charge that the application was illegally made and move that the petition be struck out "for scandal and impertinence." It is stated that none of the petitioners were owners in their own right of the stock of the Chesapeake & Ohio which they claim to own when the commission made the order, which it is now asked to rescind, authorizing persons connected with the Nickel Plate to become directors of the Chesapeake & Ohio.

NORTHERN PACIFIC.—Equipment Trusts Sold.—The \$3,525,000 equipment trust certificates, approval of the issue of which was reported in the *Railway Age* of June 6, have been sold by J. P. Morgan & Co., the First National Bank of New York and the National City Company at prices to yield 4.75 per cent.

RUTLAND, 1924 Earnings. Annual report for 1924 shows net income after charges of \$407,309 as compared with \$463,909 in 1923. Selected items from the income statement follow:

| | RUTLAND | | |
|---|-------------|-------------|----------------------|
| | 1924 | 1923 | Increase or decrease |
| Average mileage operated..... | 413 | 413 | |
| Railway operating revenues..... | \$6,509,063 | \$6,695,786 | —\$186,723 |
| Total operating expenses..... | \$5,476,007 | \$5,628,599 | —\$152,591 |
| Operating ratio..... | 84.13 | 84.06 | .07 |
| Net revenue from operations..... | \$1,033,055 | \$1,067,187 | —\$34,132 |
| Railway tax accruals..... | 297,307 | 281,170 | 16,137 |
| Railway operating income..... | \$735,324 | \$785,913 | —\$50,589 |
| Equipment rents..... | Cr. 12,466 | Dr. 1,125 | \$13,591 |
| Joint facility rents..... | 51,818 | 83,353 | —31,537 |
| Net Railway Operating Income..... | \$799,608 | \$868,143 | \$68,536 |
| Non-operating income..... | 79,087 | 51,598 | 27,489 |
| Gross income..... | \$878,695 | \$919,741 | —\$41,046 |
| Rent for leased roads..... | \$19,000 | \$19,000 | |
| Interest on funded debt..... | 447,175 | 431,460 | \$15,715 |
| Total deductions from gross income... | \$471,385 | \$455,832 | \$15,554 |
| Surplus for year carried to profit and loss | \$407,309 | \$463,909 | —\$56,600 |

SOUTHERN.—Annual Report.—See excerpts from annual report on adjacent pages.

VICKSBURG, SHREVEPORT & PACIFIC.—Tentative Valuation.—The Interstate Commerce Commission has issued a tentative valuation report as of June 30, 1918, finding the final value for rate-making purposes of the property owned and used to \$8,455,700. The outstanding capitalization was \$8,329,410 and the book investment in road and equipment was \$9,300,100, which the report says should be readjusted to \$9,239,563.

WABASH.—Purchase of Ann Arbor.—See item above.

Dividends Declared

Boston & Providence.—2½ per cent, quarterly, payable July 1 to holders of record June 20.
Cincinnati, New Orleans & Texas Pacific.—Common, 3 per cent, semi-annually; common (extra), 3½ per cent; both payable June 26 to holders of record June 15.
Fonda, Johnstown & Gloversville.—Preferred, 1½ per cent, quarterly, payable June 15 to holders of record June 10.
St. Louis, Rocky Mountain & Pacific.—Common, 1 per cent; preferred, 1¼ per cent, quarterly; both payable June 30 to holders of record June 15.

Trend of Railway Stock and Bond Prices

| | June 9 | Last Week | Last Year |
|--|--------|-----------|-----------|
| Average price of 20 representative railway stocks..... | 79.15 | 81.28 | 65.08 |
| Average price of 20 representative railway bonds..... | 91.36 | 91.58 | 86.38 |

Railway Officers

Executive

F. H. Plaisted has been appointed assistant to the vice-president in charge of traffic of the Southern Pacific, with headquarters at Chicago, a newly created position.

Frank Mulke, office manager in the executive department of the Southern Pacific at San Francisco, Cal., has been appointed assistant to the executive vice-president, with the same headquarters, a newly created position.

Financial, Legal and Accounting

C. P. Stewart has been appointed assistant general counsel of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Cincinnati, Ohio, a newly created position.

H. G. Watts, superintendent of freight loss and damage claims of the International-Great Northern, with headquarters at Palestine, Tex., has been appointed superintendent of freight loss and damage claims of the Gulf Coast Lines, with headquarters at Houston, Tex.

D. F. Lyons, general solicitor of the Northern Pacific, with headquarters at St. Paul, Minn., has been promoted to general counsel, with the same headquarters, succeeding **C. W. Bunn**, vice-president and general counsel, who is retiring from active service. Mr. Bunn will continue as vice-president and special counsel.

Operating

H. O. Schuyler has been appointed superintendent passenger transportation of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Indianapolis, Ind., succeeding **O. F. Brookmeyer**.

John A. Droege, general superintendent of the New York division of the New York, New Haven & Hartford and its subsidiary, the New York Connecting, with headquarters at New York, has been appointed acting general manager of the New Haven, succeeding **C. L. Bardo**, who, at his request, has been granted a leave of absence. **W. J. Backes**, assistant general manager, with headquarters at New Haven, Conn., has resigned, and the position has been abolished. Mr. Droege was born at Deer Park, Md., and entered railway service in 1880 as a telegraph operator on the Baltimore & Ohio. He served later as stenographer, train dispatcher, yardmaster, chief dispatcher and trainmaster—in one or more of these capacities on the Chesapeake & Ohio, the Norfolk & Western and the Southern. In 1899 he was appointed trainmaster for the Lehigh Valley in charge of tidewater terminals at Jersey City and Perth Amboy, N. J., and served also for a short period as trainmaster of the company's Buffalo and Niagara frontier terminals. In 1900 he was promoted to superintendent of the Pennsylvania and New York divisions of the Lehigh Valley, with headquarters at Sayre, Pa. In 1904 he left the service of the Lehigh Valley to become superintendent of the Providence division of the New York, New



J. A. Droege

Haven & Hartford. Two years later he was transferred to New Haven as superintendent of the company's Shore Line division. In 1913 he was promoted to general superintendent, with headquarters at New Haven, of all lines west of New London and Willimantic. In 1917 he became general superintendent at New York, in which position he was serving at the time of his recent promotion.

J. O. Halliday, superintendent of transportation of the New York, New Haven & Hartford, with headquarters at New Haven, Conn., has been appointed manager of transportation, reporting to the general manager.

W. H. Foster, general superintendent, lines west, of the New York, New Haven & Hartford, has been transferred in a similar capacity to the New York division, with headquarters at New York, succeeding John A. Droegge, promoted. **E. E. Regan**, superintendent of the New Haven and New London divisions, has been appointed acting general superintendent, lines west, succeeding Mr. Foster.

F. L. Burckhalter, assistant general manager in charge of the Northern district of the Southern Pacific, with headquarters at San Francisco, Cal., has been promoted to first assistant general manager, with jurisdiction over the entire system, and the same headquarters, a newly created position. **Thomas Ahern**, superintendent of the Sacramento division, with headquarters at Sacramento, Cal., has been promoted to assistant general manager, with jurisdiction over the Northern district, and with the same headquarters, succeeding Mr. Burckhalter. **W. L. Hack**, superintendent of the San Joaquin division of the Southern Pacific, with headquarters at Bakersfield, Cal., has been transferred to the Sacramento division, with headquarters at Sacramento, Cal., succeeding Mr. Ahern. **D. S. Weir**, assistant superintendent of the San Joaquin division, with headquarters at Bakersfield, has been promoted to acting superintendent, succeeding Mr. Hack.

Mechanical

J. M. Henry, who has been appointed assistant chief of motive power—locomotives—on the staff of the chief of motive power of the Pennsylvania system, was born on October 10,



J. M. Henry

1873, at Altoona, Pa. He entered the service of the Pennsylvania as a special apprentice in the Altoona machine shops in May, 1889, and served as an apprentice until September 1, 1896, when he entered Purdue University, being furloughed from the shops during the school term each year. He was graduated in June, 1900, and then became a special apprentice in the office of the assistant engineer of motive power at Altoona. A year later he was promoted to motive power inspector at Altoona, and in February, 1902, became assistant engineer of motive power of the Erie division and Northern Central Railway at Williamsport, Pa. From July 1, 1903, to December, 1913, he was master mechanic at various shops. On the latter date he was promoted to superintendent of motive power of the Western Pennsylvania division, and on May 1, 1916, was transferred to the operating department as assistant superintendent of the Pittsburgh division. In April, 1917, he was transferred to the New York division, and in October of the same year he was appointed assistant general superintendent of motive power at Altoona. On March 1, 1920, he was appointed one of the four regional general superintendents of motive power, which position he held until his recent promotion.

G. T. Goddard, formerly general electrical foreman in the Burnside shops of the Illinois Central, has been appointed equipment inspector of the Chicago terminal improvement department.

John T. Grow has been appointed district master car builder, district No. 1 of the New York Central and the Ottawa & New York, with headquarters at West Albany, N. Y., succeeding **G. E. Carson**, retired.

J. T. Carroll, general superintendent motive power of the Baltimore & Ohio, has been appointed general superintendent motive power and equipment, with the same headquarters—Baltimore, Md. **J. J. Tatum**, superintendent car department, with headquarters at Baltimore, has been appointed general superintendent car department, with the same headquarters.

William L. Bean, assistant mechanical manager of the New York, New Haven & Hartford, with headquarters at New Haven, Conn., has been promoted to mechanical manager with



W. L. Bean

the same headquarters, succeeding **L. M. Reed**, resigned. Mr. Bean was born on January 3, 1878, and was graduated from the University of Minnesota in 1902, having completed a course in mechanical engineering. He immediately entered the service of the Northern Pacific as a special apprentice, and served in that capacity until late in 1904. On January 1, 1905, he became a gang foreman for the Atchison, Topeka & Santa Fe. The following year he was promoted to inspector, and in 1908 to machine shop foreman. In 1909 he

became division foreman, and a few months later, motive power assistant. In 1911, he was appointed bonus supervisor and held that position until early in 1912. He then entered the service of the Oxnard Railroad Service Company as chief engineer, remaining with that company until 1916. Mr. Bean went with the New Haven in July, 1916, and in September, 1917, was made assistant general mechanical superintendent, and on November 1, 1918, mechanical assistant to the president acting in that capacity until December 1, 1923, at which time he was made assistant mechanical manager. His final work was that of assisting the president in his investigation of the property and in formulating a report and recommendations in accordance with which the program for the improvement of the property was undertaken. Mr. Bean in particular covered matters relating to mechanical department facilities, new power, etc. Subsequently it has been largely in accordance with his recommendations and plans that the very large number of improvements for affording the mechanical department better facilities have been carried out and the large purchases of new locomotives have been made.

F. L. Carson, who has been promoted to assistant superintendent motive power and equipment of the Southern Pacific, lines in Texas, with headquarters at Yoakum, Tex., was born on February 23, 1871, at Oakland, Cal. He entered railway service in 1890 as an apprentice in the mechanical department of the Atchison, Topeka & Santa Fe and was promoted to erecting foreman in 1895. He was promoted to roundhouse foreman in 1897 and to general foreman at Cleburne, Tex., in 1900. Mr. Carson was promoted to master mechanic of the Northern division in 1901, where he remained until 1905, when he was appointed master mechanic of the El Paso & Southwestern, now a part of the Southern Pacific. Two years later he was appointed master mechanic of the Mexican Central, where he remained until 1909, when he resigned to become superintendent of machinery of a mining company. Mr. Carson returned to railway service in 1912 as master mechanic

of the Chicago Great Western. Later in that year he was appointed master mechanic of the San Antonio & Aransas Pass, with headquarters at Yoakum, Tex., in which position he remained until November, 1914, when he was promoted to superintendent of motive power. He continued in that capacity until his recent appointment as assistant superintendent of motive power and equipment of the Southern Pacific, lines in Texas, as a result of the consolidation of the San Antonio & Aransas Pass with the Southern Pacific lines.

B. A. Moriarty, mechanical superintendent of the New York, New Haven & Hartford, with headquarters at Boston, Mass., has been appointed general mechanical superintendent, with headquarters at New Haven, Conn. The title of **H. P. Hass**, special assistant to mechanical manager, has been changed to assistant to mechanical manager. **F. E. Balda**, assistant to mechanical manager, has been appointed mechanical superintendent, lines east, with headquarters at Boston, succeeding Mr. Moriarty. **Kenneth Cartwright** has been appointed assistant mechanical engineer in charge of specifications, design records and standards of equipment. The marine superintendent, **J. H. Lofland**, will hereafter report to the mechanical superintendent, New York division, on maintenance matters and to the general superintendent on operating matters. **A. J. Devlin**, general supervisor of production will report to the mechanical manager.

Traffic

W. Adamson, traveling freight agent of the Northern Pacific, with headquarters at Detroit, Mich., has been promoted to general agent, with headquarters at Cleveland, Ohio, succeeding **B. M. Decker**, who has been transferred to Philadelphia, Pa.

Engineering, Maintenance of Way and Signaling

R. Hayes, structural engineer of the Southern, with headquarters at Washington, D. C., has been promoted to engineer maintenance of way, with headquarters at Chattanooga, Tenn.

W. M. Post, superintendent of telegraph and signals of the Central region of the Pennsylvania, has been transferred to Philadelphia as assistant chief signal engineer on the staff of the chief signal engineer of the system. Mr. Post was born at Andover, Conn., on July 10, 1876, and entered the signal department construction forces of the New York, New Haven & Hartford in May, 1896. He was later appointed batteryman and then promoted to maintainer. In 1900, he was appointed division signal foreman on the same road, resigning in June, 1905, to become circuit draftsman in the signal engineer's office of the Pennsylvania. In February, 1906, he was promoted to assistant supervisor of signals on the West Jersey & Seashore and in December of that year was transferred to the Pittsburgh division as assistant supervisor of signals. In February, 1909, he was promoted to supervisor, having jurisdiction over the Chautauqua division, and in June of the same year he returned to the signal engineer's office, becoming supervisor of signals. One month later he became supervisor of signals of the New York division, and in July, 1916, he returned to the signal engineer's office as signal inspector of the Eastern lines. In January, 1917, he became assistant signal engineer of the Eastern lines, and from February, 1918, to September, 1918, he was assistant superintendent of the Middle division. From September, 1918, to March,



W. M. Post

1920, he was assistant superintendent of the Pittsburgh division, and on the latter date he became superintendent of telegraph and signals of the Central region, which position he held at the time of his recent promotion.

D. B. Johnson, division engineer on the Pennsylvania, with headquarters at Louisville, Ky., has been promoted to assistant to the chief engineer maintenance of way of the Western region, with headquarters at St. Louis, Mo.

A. C. Harvey, assistant chief engineer of the Nickel Plate and Lake Erie and Western districts of the New York, Chicago & St. Louis, with headquarters at Cleveland, Ohio, has been promoted to chief engineer, with the same headquarters, succeeding **J. K. Conner**, deceased. **J. C. Wallace**, district engineer of the Lake Erie and Western district, with headquarters at Indianapolis, Ind., has been promoted to assistant chief engineer of the Nickel Plate and Lake Erie and Western districts, with headquarters at Cleveland, succeeding Mr. Harvey. **G. H. Tinker**, bridge engineer of the Nickel Plate district, with headquarters at Cleveland, has been given extended jurisdiction to include also the Lake Erie and Western district. **F. S. Hales**, engineer of track of the Nickel Plate district, with headquarters at Cleveland, has also been given extended jurisdiction to include the Lake Erie and Western district.

Purchasing and Stores

G. M. Betterton, chief clerk in the purchasing department of the Southern Pacific at San Francisco, Cal., has been promoted to assistant purchasing agent, with the same headquarters. This is a newly created position.

N. M. Rice, general purchasing agent of the New York, New Haven & Hartford, with headquarters at New Haven, Conn., has been elected vice-president in charge of purchases and stores, with the same headquarters. Mr. Rice was born on December 28, 1863, at Rome City, Ind., and was educated in the public schools of that city. He entered railway service in May, 1887, as a brakeman on the Gulf, Colorado & Santa Fe, and from this time until April 1, 1901, he held several positions in the transportation and stores department. From April, 1901, to April, 1903, he was assistant general storekeeper of the Atchison, Topeka & Santa Fe Coast Lines, at which time he became general storekeeper of the same road in charge of material, fuel and stationery. He held this position until November 13, 1913, when he was appointed general purchasing officer of the St. Louis & San Francisco, with headquarters at St. Louis, Mo. From 1915 to 1916, he was third vice-president in charge of purchases, and from 1916 to 1919, was second vice-president of the same road. From 1919 to 1920, he was vice-president of the Pierce Oil Corporation, and, in 1920, became general purchasing agent of the New York, New Haven & Hartford, and also of the Central New England and New England Steamship Company, which position he held at the time of his recent election as vice-president in charge of purchases and stores.



N. M. Rice

Special

G. J. Sielaff, formerly assistant geologist of the Southern Pacific, has been appointed geologist of that company, with headquarters at San Francisco, Cal., succeeding **E. T. Dumble**, retired.